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NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

These Notes will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893. It has, unfortunately, not appeared for some years past, owing to the inability of the Perak Government Printer to spare the type necessary to print it.

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KUALA LUMPUR.

THE EGGS AND EMBRYOS OF SCHLEGEL'S GAVIAL (*TOMISTOMA SCHLEGELI*, S. MÜLLER).

By A. L. BUTLER, F.Z.S., M.B.O.U., ETC.,

Late Curator of the Selangor Museum.

SCHLEGEL'S GAVIAL has only been recorded from the Malay Peninsula since 1896 (*Boulenger, P.Z.S.*, 1896, p. 628), and so little is known of its habits that the following note on its eggs and young may be of interest.

On the 28th of July, 1899, when I was at Kuala Selangor, Mr. Hale, the District Officer, gave me six large crocodile's eggs for the Museum. He told me that a batch of seventeen of them had been taken at the same time and brought in for the Government reward of 10 cents an egg. Of these eleven were destroyed and half-a-dozen kept for me. Four I found to be addled, the remaining two containing young crocodiles, which, from their abruptly pointed beak-like snouts, I at once recognised as young gavials.

All the eggs were very uniform in size; two of them measured $4 \times 2\frac{1}{2}$ inches and $3\frac{7}{8} \times 2\frac{1}{2}$ inches.

From the large size and number of the eggs they were probably deposited by a gavial considerably larger than any yet obtained in the Peninsula. The largest Peninsular specimen at present recorded (from Perak) measured 8 feet 9 inches.*

One of the two young gavials extracted from the eggs measured $6\frac{1}{2}$ inches in total length and $3\frac{1}{4}$ inches from snout to vent. In colour it was dark grey, the tail lighter; marked above with 12 transverse black bands, interrupted on the dorsal line (5 bands on the body and 7 on the tail); the lower parts were white.

The top of the head had a whitish appearance caused by the brain showing through thin and semi-transparent skull, but this probably disappeared before the young leave the egg.

The snout of this embryo specimen was only about twice as long as its width at the base, or about the same length as the rest of the head.

---

* This specimen, which was caught in the Perak river, near Pulau Tiga, in Lower Perak, is now in the Reptile Gallery of the Natural History Museum at South Kensington.

It is rather doubtful if the inference here drawn is correct. In the case of the common crocodile the eggs are of very uniform size, quite irrespective of the dimensions of the mother. There are five eggs of the Malayan Gavial in the Perak Museum. Their measurements are as follows:—

Locality.	Long.		Diameter.
The Kinta river	$3\frac{13}{16}$ inches	×	$2\frac{1}{2}$ inches
"	$3\frac{3}{4}$ "	×	$2\frac{9}{16}$ "
Perak river, near Telok Anson ...	$3\frac{15}{16}$ "	×	$2\frac{3}{8}$ "
... ...	$3\frac{3}{4}$ "	×	$2\frac{7}{16}$ "
Selangor, given by Mr. Butler ...	$4\frac{3}{16}$ "	×	$2\frac{7}{16}$ "

L. W.

Jan., 1905.

on abandoned tapioca estates, where it forms nests four or five feet high. It occasionally attacks coconuts, but does not do any serious damage, being more of a nuisance from the nips the powerful mandibles of the soldiers can inflict on the coolies plucking the nuts.

When the plantations are allowed to grow up in grass, the termites do not seem to ascend the trees.

Termes Malayanus.

This is the species usually written of under the name of *Termes bellicosus*, which is an allied form, confined to Africa. The nest of the species varies much in shape according to the age of the community and the type of soil in which it has been built, but large mounds may be as much as six feet high and thirty feet in circumference. It has been well described and figured by Haviland (Journ. Linn. Soc. Zool., XXVI., pp. 381 *et seq.*) and I can confirm his observations in every respect.

The species constructs globular honey-combed masses of comminuted woody fibre and cultivates a species of fungus thereon, on which the young are fed. There is not the slightest evidence that this species does any harm to living plants, and much to the contrary, and it is a very moot point as to whether the money spent in eradicating their nests might not be better employed in other directions. Should, however, the nests be destroyed care should be taken that the whole mound is thoroughly levelled and the earth well broken up and exposed to the sun. It is of no use capturing the king and queen, as the community possesses the power of rapidly replacing them by special treatment of certain larval forms. The lenticular chambers seen on the sides of road-cuttings, etc., are in the majority of instances young communities or colonies from a larger mound either of this or a closely allied species.

Termes Pallidus.

A very much smaller species generally found nesting in the outer shell of the mounds of the preceding species. It also is a fungus grower and appears to be equally harmless.

Termes Sulphureus.

A small species readily recognised by its arched abdomen, which is coloured pale primrose yellow. The nests of old and undisturbed communities are roughly cylindrical, tapering somewhat at the summit. Large nests are four or five feet in height and rather less in diameter, and are composed of a blackish grey material, more honey-combed and with far less earthy matter than that forming the nests of *T. malayanus*, and often excessively hard. The species is commoner on hill than on flat land and is not injurious.

Termes Lacessitus.

Occasionally seen on the trunks of Para and Rambong but not doing any damage. Nest of papery material, usually on trees and shrubs in secondary jungle. A species of no economic importance.

Termes Umbrinus.

This species nests in the stumps of dead trees and is often seen on the march in enormous numbers frequently travelling a distance of two

or three hundred yards in columns a couple of inches wide. It apparently feeds on dead leaves, twigs, etc., and is occasionally seen in houses situated near jungle, but does not do any harm.

V.—NATURAL HABITAT AND SURROUNDINGS OF TERMES GESTROI.

Under normal conditions—*i.e.*, on unopened land—Termes gestroi, the only white ant with which we are concerned as an agricultural pest, is by no means a common species in the Federated Malay States.

It has been met with, but only sporadically, in low-lying jungle in the Kuala Selangor and Kuala Lumpur districts, and is fairly common in the neighbourhood of Rantau Panjang and behind Morib.

So far as has been observed, it is scarce or does not occur on granite and limestone soils, nor at any great elevation. Low laterite hills, covered with small jungle, and older jungle growing on land with a heavy clay sub-soil are the most favoured localities, but as it has been met with outside the zone of cultivation only on some twelve or fourteen occasions it is unwise to dogmatise on the point. It is evident that wherever it exists some natural cause must keep it rigidly in check, as otherwise the trees on which it feeds would probably become extinct.

VI.—REASONS FOR PRESENT ABUNDANCE.

Its present abundance is only an instance of what frequently happens when the balance of nature is interfered with by the operations of man, and one has only to mention as a case in point, the plague of voles which occurred some years ago in the South of Scotland and which was directly traced to high game preserving and the consequent destruction of owls and hawks, the natural enemies of the insectivore.

The *Phylloxera*, too, originally an American insect, was never seriously dangerous to American vines, whose roots possessed the power of accommodation to the insect's attack. But when the American vine stocks, and with them the *Phylloxera*, were introduced into Europe, the native vines, which had not acquired this resisting power, were rapidly attacked and destroyed.

The conditions under which Para rubber is reputed to grow in its native forests are not such as would favour the co-existence of any great number of termites. The tree, therefore, when transported to this country, has to contend with difficulties to which the native Malayan trees have, under the stimulus of natural selection, become largely immune, and the increase of an otherwise unimportant member of the local insect fauna is abnormally stimulated.

VII.—NATIVE TREES ATTACKED.

Among native trees *T. gestroi* appears mainly to attack species of the genus *Macaranga*, which, it is significant to note, belongs to the same natural order as *Hevea brasiliensis*. Jelutong (*Dyera costulata*) is also affected, but not to any serious extent, and so are various species of *Mango*, both wild and cultivated.

Grown under artifical conditions tembusu (*Fagraea fragrans*) has been damaged, especially in the neighbourhood of Seremban and near Tampin. On one estate, where *Grevillea robusta* has been planted as

a shade tree, the ants have practically exterminated it. Coconuts are also affected but not to anything like the same extent as Para rubber. Rambong is but slightly attacked, and when it is, generally survives, a result probably due in part to its constitutional powers of resistance and in part to its habit of growth.

VIII.—AGE OF PARA WHEN ATTACKED.

It is very rare for any material damage to be done before the tree is $3\frac{1}{2}$ years old, but I can find no satisfactory explanation of this undoubted fact. It may possibly be that *Termes gestroi* is naturally so scarce and scattered that it takes an appreciable time for a sufficient stock to accumulate, but more probably the species cannot work without a minimum amount of shade, which is not afforded until the age of 3 to 4 years is attained. A third theory, to which a certain amount of plausibility attaches, is that the nests of the ants, as with certain South African species, are normally situated at a considerable depth beneath the surface, to which the roots of the rubber do not extend until the age of about four years, though this again is discounted by the situation of the nests as actually found.

IX.—INFLUENCE OF SOIL UPON T. GESTROI.

It has been demonstrated from returns sent in and from various typical estates visited, that, other things being equal, the damage caused by this pest varies more or less directly with the heaviness of the soil, light sandy loams being almost unaffected, while heavy clay soils have sometimes as many as 25 per cent. of the trees attacked. As regards drainage it is impossible to lay down any general rule. Swamp land is almost free from any species of termite, but, on the other hand, where the natural water level lies far beneath the surface termites can penetrate to a correspondingly great depth, and speaking broadly it may be said that the hill country estates in Negri Sembilan are more badly affected than those of the flats in Selangor, though possibly other causes may also have contributed to this.

Taking all considerations into account, it has, I think, been fairly demonstrated that the land best suited to Para rubber is a fairly stiff soil, capable of retaining a certain amount of moisture during drought, which is provided with a thoroughly efficient system of drainage. The slightly increased percentage of trees destroyed by ants in such a situation as compared with a light soil is probably far more than compensated for by the quicker and more luxuriant growth of the trees that escape.

X.—SPACING.

The distance between the trees is also a decided factor in their liability to attack, the wider the spacing the smaller being the proportionate number of trees lost. This is no doubt due to the desiccation of the trunks and surface soil by the sun's rays. This slight advantage seems to be far more than counterbalanced by the much smaller return per acre and the slower growth of the trees when widely planted.

XI.—INFLUENCE OF SEASON.

White ants are much more active during periods of heavy rain, or rather immediately after such rain.

XII.—METHOD OF ATTACK.

The methods of attack of *T. gestroi* are eminently characteristic, and when once their earthworks are seen and recognised, they can never be mistaken for those of any other species. The tree seems first of all to be prospected, by two or three tunnels run straight up the trunk; if the indications are favourable the whole circumference is then rapidly invested by a thick layer of mud under cover of which the ants speedily eat down to the cambium. The vast majority of attacks by individual termites are repelled by the cambium, but sooner or later a non-resistant spot is reached and the whole body of termites gains access to the interior of the tree, which is rapidly eaten out and falls. In a very considerable percentage of cases, there are no external signs of damage, and the insects enter the tree either by a lateral root from a point beneath the surface of the soil, or by way of the taproot itself. In such cases the tree may appear perfectly sound, until it falls or is blown over. Damage is caused not so much by the actual death of the tree, for in many cases the living tissues are perfectly sound, but from the weakening cf the trunk and taproot added to the natural brittleness of the wood, rendering them unable to resist the slightest wind pressure. On certain estates it has been noted, that where tapping has been somewhat roughly performed, and the cambium extensively cut into, white ants have gained access through the scars thus produced. It is therefore highly important that the cuts should be made down to but not into the cambium layer, as is the case on the Sungei Rengam Estates, where in no single instance have ants secured a foothold in the manner indicated above.

XIII.—GENERAL BIONOMICS OF TERMES GESTROI.

I have not been successful, nor, so far as I am aware, has any other naturalist, in finding the king and queen of *Termes gestroi*. Amongst numerous communities investigated one was found containing immature winged forms and eggs, but careful search failed to reveal anything in the nature of a royal cell, which in all probability is not built by this species. The vast majority of nests contain merely soldiers and workers, and I concur with Dr. Haviland in thinking that it is extremely probable that the greater number of communities are without king or queen and are merely offshoots from some central nest, from which immature forms, and possibly eggs, are conveyed. Under conditions with which we are at present unfamiliar, it is not unlikely that sexually active males and females may be produced by post-metamorphic changes. The termitaria or nests are contained within the trunks of the trees attacked and are formed of narrow labyrinthine chambers composed of woody and earthy matter that has passed through the alimentary canal of the insects, the whole of the interior of the tree being more or less filled up with this material, which replaces the wood as it is eaten away. Judging from the state of development of the immature winged forms above referred to, it is probable that the swarming season, like that of the other species of termites in this country, is from September to Christmas, and it is before and during this period that repressive measures should be most energetically carried out. It appears, too, that on any given estate, the *centres* of attack are comparatively few in number, and there is therefore the more reason to believe that if vigorous preventive measures are persevered in for a considerable time, the pest will gradually abate.

XIV.—NATURAL ENEMIES OF TERMITES.

The most important enemies of termites are undoubtedly the true ants, which may often be seen carrying off the workers to their own nests. Three specially active species are the kĕringa (*Oecophylla smaragdina*) a small red species of *Camponotus* often seen running about the trunks of the rubber, and a very long-legged, slender black species, also probably a *Camponotus*, whose nests are often found inside the termitaria, and seem to be regularly provisioned with larval white ants. Of the vertebrates, bears are reputed to occasionally break open the larger mounds, and I have seen the stomach of a binturong crammed with a small jungle-dwelling species. Birds of many varieties gorge themselves with the winged forms during swarming. Frogs and toads, including *Megalophrys nasuta*, *Bufo melanostictus* and *Callula pulchra*, also live largely on termites.

None of those enemies, however, could be made any practical use of, but it might be possible to utilise the services of a species of South African mongoose, *Herpestes badius*, subsp. *gracilis*, which experiment * has shown to feed almost entirely on white ants. Ventures in acclimatisation, however, are always hazardous, and often end in the most unlooked for and unwelcome results.

XV.—REMEDIES.

Of the host of remedies tried, it cannot be said that a single one has shown itself a conspicuous success. From the habits of the pest, as detailed in a previous paragraph, it is obvious that no ordinary insecticide can be effectual, as it is rapidly bridged over by earth, in the case of external attacks, whilst it cannot readily be applied internally. "Gondal's Fluid," a peculiarly malodorous compound containing assafœtida, London purple, copperas, petroleum, an extract of vasumba root, tuba and other direct poisons have been tried with practically no effect. At Jugra, Mr. Baxendale is using applications of hot water with satisfactory results, but his estate is by no means badly infested and the method would probably be impracticable on at all an extensive scale, and is at best a palliative.

The most successful treatment yet devised is to thoroughly scrape off all incrustation from the tree, taking care to kill the ants in so doing, and to powder the trunk thickly with freshly-slaked lime, applied in a dry state. The earth round the base of the tree should be removed to the depth of a foot or eighteen inches, and a liberal dressing of dry-lime applied. The trees should be inspected every other day, and treatment repeated if necessary.

It is a well-established fact, that white ants are very intolerant of any form of decaying animal or fœcal matter, and should the materials be available a compost of cow-dung applied to the tree might be efficacious in repelling the external attacks, while night-soil dug in to the base of the tree might ward off internal attack. The treatment of affected trees with a small quantity of an ammonium salt, preferably the sulphate, might not improbably have the same action, as Dr. Wright, of Perak, informs me that urine appplied to damaged trees rapidly

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* Report of the Hope Professor of Zoology, Oxford, 1903, p. 53.

drives off the ants, the result apparently depending on the production of ammonia during decomposition. The saving of trees attacked from the tap-root, or beneath the ground level, is a far more difficult matter, for, as noted in previous paragraphs, there is very frequently no indication of damage. Should this be detected in time, the base of the tree should be well exposed and treated with lime. If large cavities exist, two or three ounces of carbide of calcium should be introduced, with a little water, and the aperture plugged with damp clay. The acetylene gas thus produced is a fairly powerful insecticide, but its usefulness is impaired by its great diffusive power and consequent ephemeral effect. Carbon bisulphide has been suggested as suitable, and there is no doubt that this chemical is a most valuable insecticide which could be put to a multitude of uses in this country if only it was procurable at a reasonable cost and with some regularity. In England it is much used for freeing grain from weevils and could be applied to rice in this country for a similar purpose. I do not, however, think that the apparatus suggested by Mr. Bamber would prove workable in practice; it would certainly be cumbersome, extremely wasteful, and probably very deleterious to the coolies working it. Its efficacy would probably depend rather on the amount of sulphur vapour and sulphur dioxide formed, than on its output of carbon bisulphide. I have gone into the question in detail, and believe that the chemical could be produced in bulk in this country at a far less cost than it would be possible to import it for, when the prohibitive freight and heavy loss in transport is taken into account. My estimates and the facts on which they are based are embodied in Appendix *A*.

XVI.—SUMMARY.

Summarising the above information, it may fairly be taken as proved :—

(*a*) That *Termes gestroi*, comparatively a scarce and unimportant species under conditions normal to the country, has risen to the rank of a serious agricultural pest, owing to the provision in large quantities of a suitable food tree;

(*b*) That the damage caused to estates is, in the main, due to termites bred within their limits, and not in the adjacent jungle; otherwise trees near the boundaries would be most affected, which is not found to be the case;

(*c*) That less damage occurs on light soil, and when the spacing is very wide, but that this is far more than counterbalanced by the more vigorous growth and better return per acre on heavier soil more thickly planted;

(*d*) That the mischief is most active in rainy weather;

(*e*) That the nests of the termites are to be found inside the trunks of the trees destroyed, and that these nests swarm—*i.e.*, attempt to form new communities—sometime between September and Christmas;

(*f*) That no species of termite other than *T. gestroi* is injurious to living Para;

(*g*) That the attacks of the termites do not appear to be due to antecedent disease, fungoid or otherwise, though sometimes induced by mechanical injury to the cambium.

XVII.—RECOMMENDATIONS.

I have to make the following recommendations:—

(*a*) That where possible, planting be carried out by means of seed at stake and not by stumps;

(*b*) That when affected externally, trees be treated with dry lime in accordance with previous paragraphs and that when internal damage is suspected, by means of carbon bisulphide vapour forced into the cavities by means of a small pump fitted with three valves, one for admission of carbon bisulphide, from an attached receiver, one for admixture of air near the end of the stroke, and one for the expulsion of the gaseous mixture. A rough diagram* is included in Appendix A. Failing carbon bisulphide, solid calcium carbide may be used;

(*c*) That whenever a tree falls from the attacks of white ants, it should be split open, the earthy matter within removed and well mixed with lime, the stump dug out and burnt together with the trunk. The hole should be filled in with earth and lime and the ground changkoled within a radius of 20 feet. This should be done immediately on the fall of the tree and especial promptitude is indicated if the event happens at all near the swarming season;

(*d*) That the larger mound-building species be not interfered with, as in this country they largely take the place of earth worms in more temperate climates, and play an important part in the economy of nature by rapidly converting dead timber and decaying vegetable matter into a form immediately available for plant nutrition;

(*e*) That the possibility and even probability of mismanaged and neglected estates becoming a breeding ground for *T. gestroi* and hence a source of danger and expense to their neighbours, be seriously considered by the Planters' Association.

XVIII.—CONCLUSION.

In conclusion, I must express my acknowledgments for the great assistance rendered to me by the planting community in general, and to Mr. P. W. Parkinson, of Sungei Rengam Estate, in particular, to whom I am indebted for much material aid and many valuable suggestions, which are embodied in the present report.

HERBERT C. ROBINSON,

Curator.

SELANGOR STATE MUSEUM,
KUALA LUMPUR, *13th October, 1904.*

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* Not printed.

APPENDIX A.

MANUFACTURE AND USE OF CARBON BISULPHIDE.

Theoretically 100 lbs. of sulphur should yield 119 lbs. of carbon bisulphide, but after allowing for leakage and loss from imperfect condensation, it will be safer to assume that 150 lbs. of sulphur are required to produce 100 lbs. of CS_2.

Plant and building; capital cost	$2,500

Monthly production 600 lbs.

* Sulphur, 8 cwt. at $12.50	$100
Charcoal, 10 cwt. at $1.50	15
Firewood, etc.	50
Wages	40
Interest on capital 10%, sinking fund 15% ...	52
Repairs	40
	$297

or, roughly speaking, 50 cents per lb.

With a consumption of 1,200 lbs. per mensem we have—

Establishment charges	$132
Cost of materials...	330
	$462

or, $0.39 per lb., which is a very great deal lower than carbon bisulphide can possibly be imported for. The cost of materials, of wages, repairs, and capital cost of apparatus have been estimated at a very much higher rate than is likely to prevail, an exceedingly low condensation factor has been assumed, and a liberal allowance made for interest and sinking fund.

I would, nevertheless, suggest that previous to any action being taken, the Government should instruct the Crown Agents to refer the question to either Professor Tilden, F.R.S., Professor of Chemistry, Royal College of Science, or else to Professor T. E. Thorpe, of Somerset House, with the request that they should obtain plans for a plant on the following scale:—

Daily production required	70 lbs.
Working hours per day	7
Working days per month	20
Temperature of condensing water	80° F.

All parts to be easily accessible, readily replaced and as uncomplicated as possible.

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* Present price in London, retail, 16s. per cwt.

APPENDIX B.

OTHER INSECT ENEMIES OF RUBBER.

With the exception of *Termes gestroi* both Para rubber and Rambong are singularly free from insect pests of all descriptions.

The following are the only species that have been noticed as doing damage, and in all cases the damage has been quite insignificant, and shown little tendency to spread.

1. *Eumeces squamosus.*—A weevil about $\frac{1}{2}$ inch long and covered with powdery scales of a greenish or yellowish tint, which are readily rubbed off, when the insect becomes of a dull black colour. The adults cause injury by defoliating the trees, but the grubs are harmless. Described in the "Agricultural Bulletin" for January and July, 1904.

2. *Anthribid sp.*—A mottled grey and black beetle about $1\frac{1}{4}$ inch long, with antennæ (in the male) more than twice the length of the body, but shorter than half the body in the female ; head of large size, elongated, and set at right angles to the body. Very common in this country. A single specimen was caught emerging from the trunk of a Para tree, and others have been seen flying about plantations. The larvæ of this family of beetles are normally feeders on wood.

3. *Epepeotes luscus.*—Size very variable from $\frac{3}{4}$ to $1\frac{3}{4}$ inch ; antennæ more than twice the length of the body ; general colour blackish, mottled with pale cream, a velvety black spot on each shoulder, surrounded by a narrow cream line. A very common species, the larvæ, like those of the majority of the Longicorns, feeding on wood. Found once on the trunk of a Para rubber tree.

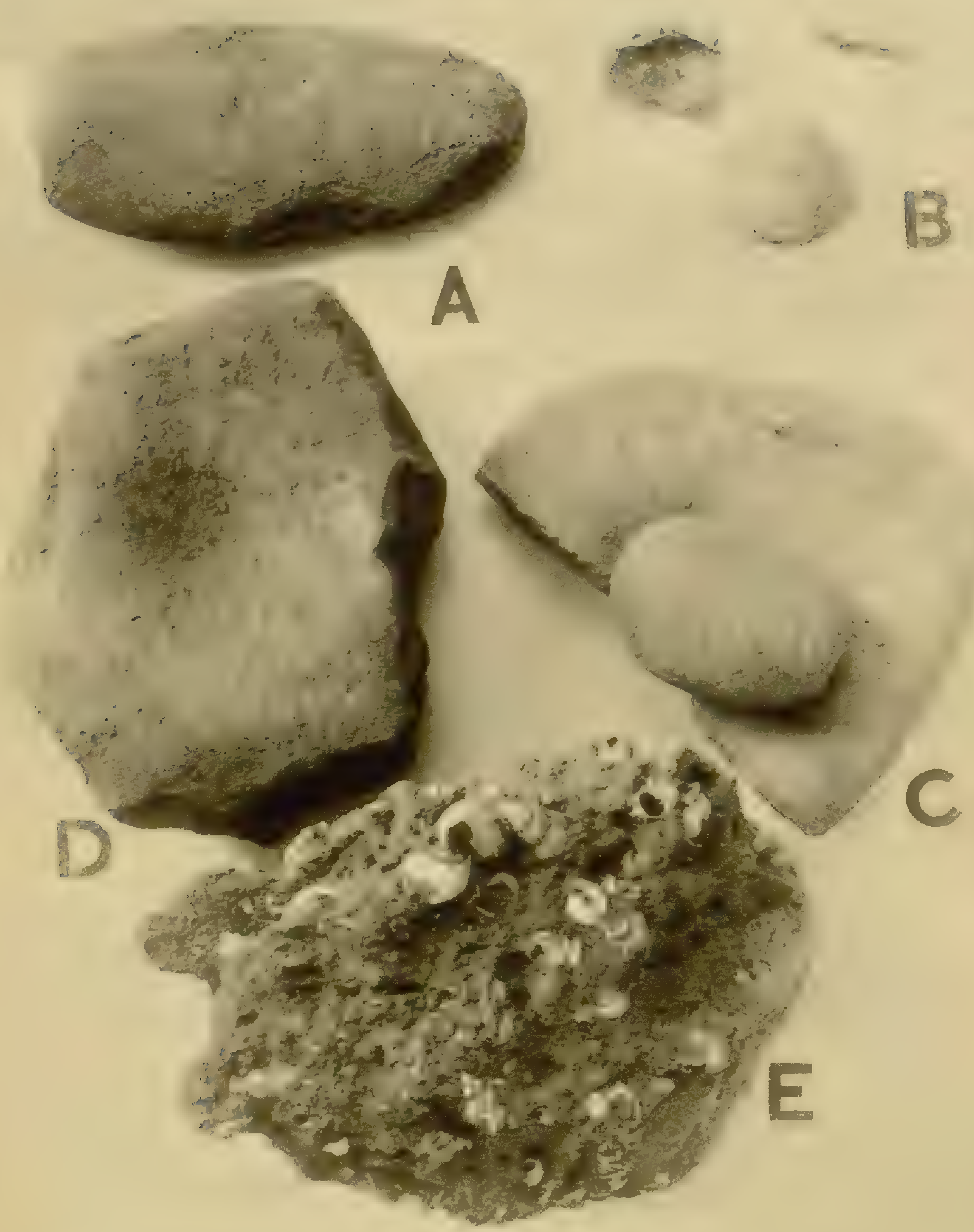
4. *Clytanthus annularis.*—(Longicorn). A narrow insect about $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{3}{16}$ inch or less broad ; antennæ filiform, not so long as the body ; general colour mustard yellow varied with black. A common and wide-spread insect, found *once* ovipositing on the stems of Para seedlings. Somewhat closely allied to the coffee borer of Southern India.

5. *Aspidiotus sp.*—A scale insect apparently belonging to this genus has once been noted on Para, but nothing more has been heard of it.

6. Small beetles of the families *Bostrychidæ* and *Scolytidæ* frequently attack the bark of Para rubber. Their efforts seem, however, to be frustrated by the latex, which exuding from the wounds coagulates round the head of the beetle and stops further progress.

7. The larvæ of a small moth, greyish-brown in colour with a pinkish tinge, and about $\frac{2}{3}$ of an inch in spread, has sometimes been found feeding on Rambong and may possibly attack Para. The species appears to be closely allied to, if not identical with, *Rhodoneura myrsusalis* found in Brazil, Natal, India, Ceylon, Burma and Borneo. The food plants in this country are species of *Palaquium* (getah taban) in whose rolled-up leaves the larvæ pupate, and the trees are damaged considerably both in a wild and cultivated state. The rigid leaves of *Ficus elastica*, however, are not quite suited to the habits of the larvæ and the damage at present effected is hardly noticeable.

It will be unwise, however, to allow taban to be planted in the immediate vicinity either of Para or Rambong.


A
B
C
D
E

FURTHER NOTES ON THE CAVE DWELLERS OF PERAK

(*WITH THREE PLATES*).

BY L. WRAY, I.S.O., M.I.E.E., F.Z.S., ETC.

SOME more work has been done in exploring the caves at Gunong Cheroh, near Ipoh, since the first paper on the subject was published in the "Journal of the Anthropological Institute," and one very interesting find made. This is the stone implement which is shown in Plate I., Fig. A. It was found about 2 feet below the present surface of the floor of the cave in the midst of the shell-and-bone deposit, very close to where the figure is seen sitting in the photograph, Plate II. This implement is made out of a hard dark stone similar to others which have been found in Perak. It may have been used in a handle, but possibly was a hand celt. It is $7\frac{3}{4}$ inches long, $3\frac{3}{4}$ inches at the widest part, $2\frac{3}{8}$ inches at the cutting edge and $\frac{15}{16}$ inch thick at the centre. It weighs 2 lb. $5\frac{3}{4}$ oz. avoirdupois. The edge is ground nearly equally from either side, and, as may be seen, is in perfect condition.

This would appear to be the first implement which has been found in the caves of the limestone hills of the Malay Peninsula. The possibility of finding them has been already discussed, and as stated in the previous paper the discovery is no proof that the stone implements, which are so numerous in the State, were made by the cave dwellers, but only that they were contemporaneous with the makers of the implements, from whom they sometimes obtained one by barter or otherwise, in the same way as the modern Sakais get iron axes and chopping knives from the Malays.

The mealing stone, Fig. D, was found in the same cave and not far from the celt, while that marked Fig. C came from the cave represented in Plate III. One perfect valve of the marine shell of *Cyrena sumatrensis*, Lour., and two portions of other valves are shown at Fig. B. Ipoh, it should be mentioned, is a long way inland, and a very difficult country must have intervened at the date of the occupation of the caves as dwellings. It is true that there is a river flowing from the hill to the sea, but before it was cleared of fallen trees and snags the navigation of it must have been attended with great difficulty, even supposing that the cave dwellers were possessed of boats, which seems to be very doubtful. The mass of shell and bone stalagmite shown at Fig. E was from the cave depicted in Plate III. There is a quantity of similar conglomerate in this cave, and apparently at an earlier date there was a thick layer of it covering a great portion of the floor. At present the floor of the cave is composed of shell and bone refuse as far out as the rocks on the right hand side of this photograph.

Further digging in the cave shown in Plate II. brought portions of three human skulls to light. The other bones of these skeletons were also found in a more or less perfect state, in their natural positions. These bones, like those previously found, were all in a very much crushed and broken state from the trampling of the elephants which used to frequent these caves. The only chance of getting a perfect skull would be to find one close up to the rock where the slope of the roof would be such as to have prevented the approach of an elephant. These fresh finds of human skeletons go far to confirm the theory of

burial advanced in the former paper. Few of the other bones found were more than fragments, but some of wild pig and deer were determinable.

In the photograph of this cave a section of the deposit is shown, and with a magnifying glass the shells may be distinctly made out. Beneath the human deposit is a layer of coarse river sand. This was undoubtedly deposited by the river, as it shows distinct traces of bedding. No shells were found in it, but this is the case with the other river and alluvial deposits everywhere in the State. The bed of the Kinta river is at present some 40 feet lower than the floor of these caves and it flows about 100 yards to the right of the foot of the hill.

The caves are about 150 yards round the cliff to the right from the marble quarry. Between the two places are some extensive and beautiful caverns which the Chinese have unfortunately been allowed to vulgarise by making into a tawdry temple. Altars, incense, candles and the other adjuncts of the lower forms of religion seem so much out of place when brought into close proximity to the beautiful works of nature. The floors of these caverns contain no evidences of human occupation.

Since the above was written, I have seen near Pulau Tawar, in Pahang, quite a number of Sakai living-places, in the caves of a limestone hill called Kota Glanggi and a hill near it. The caves were mostly of the rock-shelter type. There were no Sakais then in them, but they had been there quite recently. The living-places were quite simple, consisting of a number of small sticks placed side by side on the ground, forming a small *lanti* on which to sleep; by the side of it was a raised *lanti* of sticks, with the fireplace beneath it. On this shelf they keep firewood, edibles, etc. The fireplace was on the ground and the fire of sticks was made between three or four stones. In some cases there were two beds with a fire in the middle and in others only one; each bed being just large enough to accommodate one person, measuring about 5 feet long by 2 feet wide. The whole was more or less enclosed by a fence of sticks, some 4 to 4½ feet high. Sometimes this fence was on one side, sometimes on two sides and occasionally on three sides. In one case the hedge was formed of sticks on which the branches and dead leaves still remained. The others were mere open-work fences of small sticks tied together with rattan and jungle creepers. In some of the caves there were five or six of these separate sleeping places. In most cases, near each was a stick planted in the ground, having two or more forks, formed by cutting off the branches some six or eight inches from the main stem, at the upper end of it. It appeared to be used for hanging baskets, etc., on and also for leaning blowpipes and spears against, and in fact to take the place of our hat-stand. On the ground near the sleeping places were many bones, shells, Indian corn husks and the shells of kapayong and other jungle fruits. The molluscan shells were both land and fresh water. In one place there were a number of *Unio* shells.

Wrapped up in leaves were bundles of bones of animals. These packets were placed in holes in the walls and roof of the caves. I found many of these packets, and brought some away with me. These latter are now in the Perak Museum. The packets did not contain the whole of the bones of an animal, but portions only, apparently the

bones of the part eaten by a single individual at a meal. In three cases there were the skulls of gibbons; other packets were of the bones of musangs (*Viverridæ*), while lying about were some fragments of large bones, possibly deer.

We have in this most interesting case an example of the way in which the modern Sakai, of Pahang, lives in these limestone caves. It bears out the conjectures I ventured to make regarding the cave remains in Perak and goes a long way towards proving that the people who inhabited the Perak caves were Sakais also.

NOTE ON A GENUS OF BUTTERFLIES NEW TO THE MALAY PENINSULA.

AMONGST a few butterflies collected in July, 1904, by the Museum collectors on Bukit Kutu, Selangor, at an approximate altitude of 3,200 feet, there occurs a species of the Lemoniid genus *Dodona*, Hewitson, which has not hitherto been recorded from the Malay Peninsula, though a species is known from Borneo.

The specimen in question appears to be referable to *Dodona deodata* of which the synonymy is as follows:—

DODONA DEODATA, HWTSN.

Dodona deodata, *Hewitson, Ent. Month. Mag.*, xiii. p. 151 (1876); *Marshall and de Nicéville, Butter. of India*, ii. p. 312 (1886); *Elwes*, P.Z.S., 1891, p. 288, pl. xxvii., fig. 8.

Dodona longicaudata, *de Nicéville, Proc. Asiat. Soc. Beng.*, 1881, p. 121; *Marshall and de Nicéville*, op. cit. p. 313 pl. xxiv., fig. 117.

Dodona deodata was originally described from a worn specimen which had lost its tails and is now considered identical with the more recently described *D. longicaudata*.

General Range. Assam (Shillong), Burma (Karen Hills), Moulmein?

All members of the genus are hill-ranging species found on deep forest, and the locality, Moulmein, whence the original specimen of *D. deodata* is said to have come, is open to considerable doubt.

NOTE ON A BLIGHT AFFECTING SUGAR CANES AT NOVA SCOTIA ESTATE, LOWER PERAK.

BY L. WRAY.

THE so called "black mould" on the sugar canes is only a secondary symptom, the true cause of the disease being one of the insects popularly known as "mealy bugs." The adult insect is coated with a white powdery covering, hence its name. It lives by sucking the juice of the leaves and leaf-stalks and the black substance is excreted by it, being very noticeable on the dead and dying leaves.

The blight occurs in patches amongst the young canes and afterwards spreads, over considerable areas, as the canes grow. Each centre of infection may spread to as much as 400 square feet, by the time the canes are fit to crush. The size of the patches evidently depends on the period of infection. The blight may be carried about and distributed by the coolies passing along the rows of cane, or along the footpaths round their edges, as the insects fall off when the cane is shaken or a person brushes against it. This view is supported by the fact that the edges of the fields are more affected than the interiors.

The blight attacks the leaves, and, as they die off, ascends to the younger ones. Ultimately the cane also either dies or stops growing, and in the latter case is of little or no use in the mill, as it contains hardly any sugar.

I would suggest that the best way of arresting the progress of the blight is to spray the affected plants with kerosene oil emulsion. The emulsion I would recommend is made as follows:—

Calvert's carbolic soft soap	1 ℔.
Hot water	2 gallons
Kerosene oil	4 „

The water should be boiled and the soap dissolved in it. Then while still hot the oil is added and the whole violently agitated until it assumes the appearance and consistency of cream and there is no free oil floating on the surface, after standing for a short time.

The best way to churn it up, is to use a syringe. Sucking it up and then squirting it out again into the containing vessel. This action if continued for about ten minutes will usually suffice. This emulsion will keep for any length of time. When required for use it should be stirred up and diluted by mixing one part of it with nine parts of water. The water used should be fresh and soft, for if salt, or even if very hard, the soap is deposited and the oil separates out and rises to the surface. Rain water or condensed water would be the best to use. If neither can be obtained a milk emulsion might be tried. This is made in the same way as above described, but in place of the soft soap, a tin of condensed milk is substituted.

The fluid is to be sprayed on to the blighted cane with some sort of syringe. The best kind is one fitted with a cyclone nozzle, as it gives the finest spray and therefore wets a greater surface in proportion to the amount of liquid used.

A handy form of apparatus is made in America, consisting of a flat tank, to be worn as a knapsack on the back, containing a pump; which is worked by a handle hanging over one shoulder with one hand and having a flexible pipe ending in a cyclone nozzle which can be directed with the other hand. This apparatus costs about ten American dollars. There is one in the Perak Museum which can be seen by anyone interested in the subject.

It may be mentioned here that the kerosene oil emulsion, above described, has been successfully used for a long time past to kill various insect pests attacking the vegetables grown on the hill gardens near Taiping. It was first suggested by me to kill the caterpillars which at that time were destroying all the cabbages in the gardens.

If possible, the soap emulsion should be used for the mealy bugs, as it will be more likely to get at them than other forms of emulsion. The white waxy covering protects the insects from water. Soapy water would, however, probably break down this defensive protection and allow tne emulsion to get at the insect. The young are not protected and will therefore easily be killed.

If a lookout is kept on the fields and the patches of blighted canes are sprayed as soon as noticed, it is probable that it may quite easily and cheaply be kept in check. This blight lives on many plants besides sugar canes and should be destroyed wherever found about the estate. All insects of this class are most prolific and multiply with extraordinary rapidity, when there is a sufficiency of suitable food available. It might, therefore, at any time assume serious proportions, though, I understand, up to the present it has not done much damage on Nova Scotia Estate.

2nd October, 1901.

NOTE ON *RATUFA BICOLOR*, THE LARGE MALAY SQUIRREL.

By FREDERIC W. KNOCKER.

A FEMALE specimen of, what the writer considers to be, one of the numerous varieties of *Ratufa bicolor*, recently presented to the Perak Museum by Mr. Lauder Watson, of Sungei Siput, is worthy of note as not only differing slightly from any variety yet described, but also in its close resemblance to a male squirrel from Simpang already in the Museum collections and labelled *Sciurus laticaudatus*.

A description of the former, made whilst still in the flesh, is as follows :—

Length of body and head	1 ft. $3\frac{1}{4}$ in.
Length of tail to extremity of caudal vertebrae, without hair	1 ft. $4\frac{1}{2}$ in.
Length of hind-foot...	3 in.
" ear	1 in.

The inguinal mammae (six in number), soles and palms, black.

The prevailing colour is rufous, the whole of the back, with the fore-limbs and back of neck grizzled with black, which appearance is given by the markings of the single hairs being dusky brown at the basal portion, then a single annulation of light rufous and tipped with black (? very dark brown). The whole of the underparts pale ferruginous, this colour continuous also on the inside of the limbs, but a shade darker. The outer portion of the hind limbs is dusky rufous, not grizzled; whilst on the upper part of the thigh is a broad band of pale buff about an inch wide. The feet are dark brown, the inner half being streaked slightly with yellow. The hair on the back of the hands is darker than that of the fore-arm; the fingers same as the feet. Crown of the head is grizzled rufous but lighter than that of the back. Forward it shades off to a grizzly grey, which extends downwards in front of the eye to the chin. The nose dark rusty brown; cheeks greyish white, from which spot spring the blackish moustachois, the

whiskers and other bristles of the face being of the same hue. The ears are small, with short dark brown hairs; irises reddy brown, and there is a dark crescent-shaped streak under each eye. The long distichous tail is of a uniform dull brick red, excepting the last four inches, which is dark brown, slightly mixed with pale buff hairs, preceded by a dark brown bar. The underneath is paler, and the vertebrae are covered with short blackish hairs, forming a conspicuous central line.

This distinct structure of the tail from that of the typical black specimens seems to have been overlooked by writers subsequent to Cantor, although even this author does not actually draw attention to the difference. But he classifies these varieties under "Var. B" with the "*Syn.-Sciurus auriventer*, Is. Geoff. apud Schinz," and in the course of the description he notes:—"On the lower surface of the distichous tail the roots of the hairs form a white line on either side of the vertebræ, which are covered with short dark brownish or fulvous hairs." This, however, is not the case with the black specimens, the hairs directly covering the central line of the vertebræ on the ventral surface, although distinct, being much longer, and the whole appendage is round and bushy compared with the flat and "feathery" structure of the so-called varieties. On close examination it is found that the long hairs of the varieties mostly spring from the sides of the vertebræ, being quite scanty on the dorsal surface—hence the feathery appearance. But in the typical animals they spring from all round the vertebræ and are much more profuse—hence the apparent roundness. These notes, which the writer ventures to think may be of significance, are made from the three specimens now in the Perak Museum collections, but Mr. Wray assures me that it is exactly the same with the specimens in the Selangor Museum, which he has quite recently examined. Measurements taken of the short vertebral hairs of the Perak specimens result as follows:—

Typ.	27 mm.
Var.	(Simpang) 11 mm.
Var.	(S. Siput) 9 mm.

Thus apart from the other differences pointed out this alone would appear to be worthy of attention.

The squirrel from Simpang has been noted by Flower in his "Mammalia of Siam and the Malay Peninsula," as *Funambulus laticaudatus* ("P.Z.S.," 1900, p. 359). Mr. Wray, however, is now of the opinion that it is not this species but that it is one of the so-called varieties of *bicolor*. In general appearance it resembles the specimen above described very closely, the light band on the thigh and the dark brown and greyish markings of the face being characteristically alike. Two differences readily recognised, however, in the Simpang specimen, are absence of the rich grizzled appearance of the back, the whole coat by comparison being yellowish, and the shortness of the tail, which is the exact length of the body and the head (1 ft. 3 in.). The hair on the upper part of the tail also is blacker, but the dark-coloured bar and darker extremity is absent; and underneath, the dark medial line, formed by the short hairs covering the vertebræ, is bordered on either side by a broad whitish line irregularly banded with dark brown. These latter notes, however, are made from the specimen as it is now after many years' exhibition in the Museum. On the whole

it may possibly bear some resemblance to the Pahang squirrels of the same species mentioned by Ridley ("Journ. Str. Br. Roy. Asiatic Soc." No. 25, 1894, p. 58) as "of a dirty yellowish white colour almost tawny on the back."

The new specimen from Sungei Siput, I am inclined to think, finds its nearest resemblance in specimen "R" of the Indian Museum catalogue ("Cat. Mamm. Ind. Mus." ii., 1891, p. 8) "from the crown of the head to the root of the tail it is a bright grizzled yellow, each hair being brown with a bright yellow tip, the hands, cheeks and throat are whitish, the end of the nose and chin alone being dark." Again, the two Bornean specimens "Z" and "A 2" are "very dark grizzled above but with yellowish not blackish feet." It is just possible therefore that the squirrel under consideration is intermediate between these two varieties. The specimen "R" is a male animal from Perak.

There is but one typical specimen (from the Larut Hills) in the Perak Museum—the animal with the "intense shining black" upper-parts and under-parts of a "deep golden fulvous," the quoted words being Cantor's.

Other references not mentioned in the context are:—

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PERAK MUSEUM,
2nd November, 1904.

FURTHER ADDITIONS TO THE BATRACHIAN FAUNA OF THE MALAY PENINSULA WITH A LIST OF THE SPECIES AT PRESENT KNOWN TO OCCUR THEREIN.

By HERBERT C. ROBINSON.

IN the "Proceedings of the Zoological Society of London, 1902 (2)," pp. 188 *et seq.*, Mr. A. L. Butler gives a list of recent additions to the Batrachians known from this country, bringing up the total number to 58 species. To these should be added two species, *Ixalus horridus* and *Rhacophorus robinsonii* recently described by Mr. Boulenger, while I have now to include four more species, also identified by the same distinguished authority.

NECTOPHRYNE HOSII, BOULENGER.

Originally collected by Mr. Hose in the neighbourhood of Mt. Dulit, Sarawak, Borneo, and described by Mr. Boulenger.

Two specimens, male and female, were captured in a tree in deep jungle about nine miles from Kuala Lumpur, and, owing to the striking dissimilarity in the sexes,* were at first thought to be distinct species.

The female, which is very much larger than the male, is coloured greenish olive and is profusely spotted with clearly defined bright chrome yellow spots, while the male is uniform dull olive brown above, dirty white beneath.

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* This difference has also been noted by Mr. Shelford (*cf.* Report, Sarawak Museum, 1901-2, p. 14).

The genus *Nectophryne* is notable for the abnormal distribution of its numbers, species being known from the Malayan countries, Malabar, and from West Africa, but not from the intervening regions, a parallel case occurring in the genus *Pitta* among birds and in certain genera of longicorns. *Nectophryne* is as a rule decidedly rare and it may be worth while recording that the other Peninsular species, *N. guentheri*, previously only known from Singapore, so far as this fauna is concerned was recently found by me on the Sungei Longkoi, a small stream on the borders of Selangor and Jelebu.

RANA NIGROVITTATA, Blyth.

This species was originally described from Tenasserim by Blyth (*Journ. Asiat. Soc. Beng.* xxiv. 1855, p. 718), but his description was bad and the species remained unrecognised until it was rediscovered in Upper Burma by Signor Fea, whose collections were worked out by Mr. Boulenger (*Ann. Mus. Civ. Genoa* (2) xiii. 1893, p. 334, pl. viii. fig. 3). Immature specimens were obtained in January, 1904, from muddy pools at the foot of the limestone hills in which the Batu Caves are situated.

RANA NICOBARIENSIS, Stol.

First discovered in the Nicobar Islands and subsequently in Nias and Sumatra. Several young individuals were secured in the same situation as the preceding species.

IXALUS, Sp. Nov.

This frog, which Mr. Boulenger informs me is a new species, was noted by Mr. Ridley in the jungle near Batu Tiga. It was sitting on a gingerwort with the body much flattened and presented an extraordinary resemblance to a dead and bleached leaf. Its forelegs were extended in front of its head and its hind legs closely adpressed to the body so that the posterior portion of the body appeared to be the anterior, an illusion that is commonly cultivated as a means of protection by several animals, notably butterflies of the genus *Cyrestes* and by certain Homoptera.

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DISTRIBUTION OF THE BATRACHIANS AT PRESENT KNOWN TO OCCUR IN THE MALAY PENINSULA.

Name.	Penang and Kedah.	Perak.	Selangor and Negri Sembilan.	Malacca, Johore and Singapore.	East Coast, Malay Peninsula.	Ceylon.	Peninsular India.	Assam, Burma, Tenasserim.	Siam, Indo-China, S. China.	Borneo and Natuna Ids.	Java.	Sumatra and Mentawei Ids.	Remarks.
APODA.													
Cœciliidæ.													
1. Ichthyophis glutinosus, Linn.	—	—		—	—	—	—	—	—	—	—	—	
2. „ monochrous, Blkr.		—				—	—			—	—		
ECAUDATA.													
Pelobatidæ.													
3. Megalophrys montana, Kuhl.	—	—	—		—						—	—	Also in Palawan and Dinagat.
4. „ nasuta, Schlg. ...	—	—	—	—						—	—	—	
5. „ longipes, Blgr. ...		—	—										
6. Leptobrachium hasselti, Tsch.		—	—	—	—			—		—	—	—	
7. „ heteropus, Blgr.		—											
8. „ pelodytoides „		—						—					
Bufonidæ.										—			
9. Bufo penangensis, Stol. ...	—	—								—			
10. „ jerboa, Blgr.		—	—										
11. „ asper Gravenh.	—	—	—	—	—			—		—	—	—	
12. „ melanostictus, Schn. ...	—	—	—	—	—	—	—	—	—	—	—	—	
13. „ parvus, Blgr.	—	—		—	—			—				—	
14. „ quadriporcatus, Blgr. ...		—		—						—		—	
15. „ divergens, Ptrs. ...			—							—			
16. Nectophryne guentheri, Blgr.			—	—						—		—	
17. „ hosii, Blgr. ...			—							—			New to this fauna.
18. Nectes subasper, Tsch. ...			—								—		
Engystomalidæ.													
19. Calophryne pleurostigma ...			—	—				—	—	—			
20. Phrynella pulchra, Blgr. ...				—								—	
21. „ pollicaris „ ...		—								—			
22. Microhyla ornata, D. & B. ...	—				—	—	—	—	—				
23. „ inornata, Blgr. ...					—			—	—	—		—	
24. „ leucostigma „ ...		—								—			
25. „ butleri „ ...		—											
26. „ pulchra, Hallow. ...					—				—				Also known from China and Hongkong.
27. „ achatina, Boie. ...	—		—	—				—	—	—	—	—	Extending to the Moluccas.
28. „ annectens, Blgr. ...		—	—										
29. „ berdmorii, Blyth. ...				—				—	—				
30. Callula pulchra, Gray. ...			—	—	—	—	—	—	—				Also in Celebes.
Ranidæ.													
31. Oxyglossus lima, Gravh. ...	—				—		—	—	—		—		
32. „ lævis, Gunther. ...		—			—			—		—	—	—	Reaching the Lesser Sunda Ids. and the Philippines.
33. Rana cyanophlyctis, Schn. ...	—					—	—						
34. „ kuhli, D. & B.		—	—					—	—	—	—	—	Also in Celebes.
35. „ laticeps, Blgr.		—		—			—						
36. „ macrodon, Kuhl. ...	—	—	—	—	—			—		—	—	—	Lesser Sunda Ids. and the Philippines.
37. „ doriæ, Blgr.		—						—					
38. „ plicatella, Stol.	—	—											
39. „ hascheana „	—	—											Also the Lesser Sunda Ids.
40. „ tigrina, Daud.	—	—	—	—	—	—	—	—	—	—	—	—	China and Formosa.
41. „ limnocharis, Bore. ...	—	—	—	—	—	—	—	—	—	—	—	—	As above.
42. „ macrodactyla, Gthr. ...	—	—						—					
43. „ erythræa, Schlg. ...	—	—	—	—	—			—	—	—		—	Also in Celebes and the Philippines.

Distribution of the Batrachians at Present Known to Occur in the Malay Peninsula—(*cont.*)

Name.	Penang and Kedah.	Perak.	Selangor and Negri Sembilan.	Malacca Johore and Singapore.	East Coast Malay Peninsula.	Ceylon.	Peninsular India.	Assam, Burma, Tenasserim.	Siam, Indo-China, S. China.	Borneo and Natuna Ids.	Java.	Sumatra and Mentawei Ids.	Remarks.
Ecaudata—(*cont.*)													
Ranidæ—(*cont.*)													
44. Rana nigrovittata, Blyth. ...			—					—	—				New to this Fauna.
45. „ labialis, Blgr.		—	—	—	—					—		—	
46. „ jerboa, Gthr.			—							—			
47. „ lateralis, Blgr.					—			—					
48. „ luctuosa, Ptrs.	—	—								—			
49. „ signata, Gthr.		—								—			
50. „ nicobariensis, Stol. ...			—									—	New to this Fauna.
51. „ glandulosa, Blgr. ...		—	—	—						—			Extending to Palawan.
52. „ livida (Blyth.)		—	—					—					
53. „ larutensis, Blgr. ...		—	—										
54. Rhacophorus leprosus, Tsch.		—	—									—	Lesser Sunda Ids.
55. „ leucomystax, Gravh.	—	—	—	—	—			—	—	—	—		Philippine and Borneo.
56. „ bimaculatus, Blgr.		—						—					
57. „ robinsonii, Blgr. ...					—								
58. „ nigropalmatus, Blgr.		—			—					—		—	
59. Ixalus larutensis, Blgr. ...		—			—								
60. „ pictus, Ptrs.		—	—	—						—			
61. „ vermiculatus, Blgr. ...		—											
62. „ asper, Blgr.		—	—					—	—				
63. „ horridus, Blgr. ...					—								
64. „ sp. nov.			—										

A MALAY METHOD OF TREATING TOOTHACHE.

By L. Wray.

THE following method of expelling the maggots or worms (*ulat*) which are supposed by the Malays to be the cause of toothache was observed recently in Larut, Perak; the patient being a Javanese gardener, who said he had had toothache for some days past.

The blade of a changkul or digging hoe was supported horizontally on two bricks, one placed at either end of it, and a fire of sticks kindled on the ground between them and beneath it. On the middle of the changkul was put a small heap of the seeds of a red-fruited variety of bringal or egg-plant (*trong*), and over this was inverted the half of a coconut shell (*tempurong*) having a hole in the top of it. A piece of bamboo about eighteen inches long and three quarters of an inch in diameter was stuck on to the shell over the hole by means of a lump of clay. As soon as the changkul got hot, vapour issued from the upper end of the bamboo tube and the patient inhaled this by placing his lips to the top of the tube. After a short time he spat into a bucket of water, which had been provided for the purpose, and then again inhaled the vapour from the bamboo, continuing the process for some time. A friend meanwhile kept examining the ejected matter in the bucket, and, after the lapse of perhaps a quarter of an hour's treatment, said he could detect a worm in the water, and after another inhalation and expectoration discovered a second. Both men after looking at the worms in the bucket were quite satisfied with the success of the operation and the fire was put out and the treatment concluded. The Javanese the next day stated that he was quite cured.

The vapour from the seeds was said to be very pungent (*pedas*) and bitter (*pahit*). The variety of the egg-fruit used in this cure is a thorny bush, bearing small red fruit. It is wild and fairly common in scrub jungle around villages.

It is, perhaps, needless to add, that a close inspection of the supposed worms, disclosed the fact that they were only thin strings of saliva floating in the water.

LIST OF A SMALL COLLECTION OF MAMMALS, BIRDS AND BATRACHIANS FROM GUNONG ANGSI, NEGRI SEMBILAN.

By HERBERT C. ROBINSON, M.B.O.U.

I AM not aware that any account of the fauna of the mountains of the Malay Peninsula between Batang Padang on the north and Gunong Ledang (Mt. Ophir) on the south has as yet been published. The present list may therefore be of interest as showing that the characteristic Himalayo-Sondaic forms, such as *Sibia*, *Mesia*, *Pterythius*, do not occur on the mountains of Negri Sembilan, which appear to be inhabited, so far as our present information goes, by typical Malayan forms identical with those found on Mt. Ophir and in the Johore hills.

Gunong Angsi is the highest point of a range of hills, which attain a maximum elevation of about 3,200 feet, and is situated about eleven miles from Seremban. It is not connected with the main range, and is covered with heavy timber, but the jungle is drier and more open than that found on the mountains of Selangor and S. Perak. The collection, of which a list is given below, was made by the Dyak hunters of the Selangor Museum during the last fortnight in November, 1904.

MAMMALIA.

1. Hylobates syndactylus (Desm.); *Flower, P.Z.S.*, 1900, p. 313.

A very large male of the Siamang, which, with the exception of the specimen recorded by Mr. Flower, does not seem to have been previously obtained in the Negri Sembilan.

2. Hylobates lar (Linn.); *Flower, op. cit.*, p. 312.

A single immature female of the black form. The parent, which was not secured, was said to be yellowish white. The occurrence of these two species on the same hill is interesting, as according to native statements they are never found together.

3. Sciurus tenuis (Horsf.); *Flower, op. cit.*, 357.

One specimen.

4. Funambulus insignis (F. Cuv.); *Flower, op. cit.*, p. 360.

Agreeing precisely with others from Tetom (Perak-Pahang border) and Bukit Kutu, in having much rufous on the upper surface, thereby differing from the East Coast form. *F. insignis jalorensis*, Bonhote.

5. Ratufa bicolor (Sparrm.); *antea*, p.

Two specimens, an old female and a younger male, agree very closely with that described by Mr. Knocker, both have the upper surface a dull gray with a yellow tinge becoming darker on the head. The tail of the female is a dark sooty grey, perfectly uniform on the upper surface, the basal portions of the hairs being a creamy buff showing through on the ventral aspect of the tail. The tail of the male is a dirty greyish drab, regularly barred with yellowish drab, the bars being equal in width to the interspaces.

AVES.

1. Parus sultaneus (Hodgs.).

An adult and immature male of the Sultan Tit.

2. Pomatorhinus borneensis cab.

Four specimens of the Bornean Scimitar Babbler, agree perfectly with examples from the Larut Hills and from Sarawak. The species does not appear to occur on the Selangor Hills, as neither Mr. Butler, Mr. Craddock or myself have met with it.

3. Turdinulus humei, *Hartert, Nov. Zool.* ix., p. 564, (1902); Turdinulus exsul, *Ogilvie Grant, Ibis*, 1896, p. 480; *Blanf. Faun. Brit Ind. Aves*, iv., p. 480 (1898).

Four specimens of a Short-tailed Babbler, agree perfectly with Mr. Hartert's description of the type from Gunong Tahan, while another specimen is also recorded from Klang. It is possible, however, that the form is identical with that described as *Turdinulus granti*, Richmond (Proc. U. S. Nat. Mus., xxii., p. 320, 1900). from the mountains of Trong, a small State on the West Coast of the Peninsula, about 100 miles north of Penang.

4. Anuropsis malaccensis (Hartl.).

A single specimen of the Malaccan Wren Babbler.

5. Malacopteron magnirostre (Moore).

One female of the Brown-headed Tree Babbler.

6. Alcippe cinerea (Blyth).

One female of the larger Nun Thrush.

7. Cyanoderma erythropterum (Blyth).

The Red-winged Babbler, of which one specimen was secured, is a decidedly rare bird in Malayan collections.

8. Mixornis gularis (Raffles).

A specimen of *Mixornis* must apparently be referred to this species, but has the shaft stripes on throat and chest very narrow.

9. Larvivora cyanea (Pall.).

An adult male of the Siberian Blue Chat in full plumage; the only other specimen recorded from the Peninsula of recent years is one collected on Bukit Kutu, 3,300 feet, Ulu Selangor, in November, 1898, by Mr. A. L. Butler.*

10. Herpornis xantholeuca (Hodgs.).

One specimen of the White-bellied Herpornis.

11. Criniger, sp.

A young bird, in full moult, appears to belong to *Criniger tephrogenys*, Jard and Selby, and not to the closely allied *C. ochraceus*, Moore, both of which species have until recently been confounded under the name *C. gutturalis*, Bp. (cf. Hartert, Nov. Zool. ix., pp. 558, 559, 1902.) All the specimens, eleven in number, that I have examined, from above 3,500 feet belong undoubtedly to the greyer, long-tailed *C. ochraceus*, which I am inclined to think will prove to be the mountain form, while *C. tephrogenys* inhabits the low country and foot-hills.

12. Hemixus cinereus (Blyth).

The Ashy Bulbul is abundant on Gunong Angsi, and is a typical inhabitant of the mid-altitude forest zone.

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* Since the above was written I have shot a somewhat immature male on the Pahang side of the main range, about 25 miles from Kuala Lumpur, at an altitude of 2,500 feet.

13. Dendrophila saturatior (Hartert).

Sitta frontalis saturatior, *Hartert, Nov. Zool.* ix., p. 573, (1902.)

All specimens of this Nuthatch from the Malay Peninsula that I have seen agree in having the under surface strongly suffused with lilac, the coloration being much more intense than in specimens from India, as is usually the case in a region of greater rainfall.

14. Dicrurus annectens (Hodgs.).

A somewhat immature female of this Drongo has the belly, axillaries and under wing coverts broadly tipped with white.

15. Phylloscopus borealis (Blas.).

A single male of the Arctic Willow Warbler.

16. Tephrodornis gularis (Raffles).

The Malay Wood-shrike, a rare and local bird in the centre and north of the Peninsula, is well represented in the present collection.

17. Campophaga neglecta (Hume).

An immature male of Hume's Cuckoo-shrike, in banded plumage, with the supercilium fairly well marked.

18. Hemichelidon sibirica (Gm.)

A pair of the Sooty Flycatcher.

19. Philentoma velatum (Temm.)

Two females of the Maroon-breasted Flycatcher.

20. Rhipidura perlata (Müll.)

The Spotted-breasted Fan-tailed Flycatcher is by no means a common bird in the Malay Peninsula. Two males were secured.

21. Terpsiphone incei (Gould).

A pair of the Chestnut-tailed Paradise Flycatcher.

22. Geocichla davisoni (Hume).

I have doubtfully referred a single female Thrush in perfect plumage to this species. Males have been previously obtained by Mr. Wray on the Larut Hills and by myself on the Batang Padang mountains.*

23. Æthopyga temminckii (Vig.)

Two males of the Scarlet-breasted Sunbird. Always a very rare and local species. Mr. Butler collected it on Bukit Kutu and Ginting Bidei, in Selangor, and on the Larut Hills.

24. Anthothreptes hypogrammica (Müll.)

A pair of the Banded Sunbird. In deep jungle this species takes the place of *A. malaccensis*, which is rarely, if ever, found far from villages and coconut palms.

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* A male, either of this species or *G. sibirica*, was obtained by me on 19th December on Pulau Jarak, a small island off the mouth of the Perak River, about 50 miles from land. The skin was unfortunately stolen by rats.

25. ARACHNOTHERA CRASSIROSTRIS (MÜLL.).

A female of the Thick-billed Spider-Hunter. Very common round Kuala Lumpur.

26. EURYLŒMUS JAVANICUS (HORSF.).

27. EURYLŒMUS OCHROMELAS (RAFFLES).

28. CORYDON SUMATRANUS (RAFFLES).

These three species of Broad-bills are all evidently common on Gunung Angsi.

29. GAUROPICOICLES RAFFLERI (VIG.).

Raffles' Three-toed Woodpecker. Is apparently commoner in the southern parts of the Peninsula than in Perak and Selangor, in both of which States it is distinctly rare.

30. LEPOCESTES PORPHYROMELAS (BOIE).

One female of the Malay Bay Woodpecker. I am inclined to think that this species iso ne that is becoming exterminated by the progress of cultivation, especially that of tapioca. It was evidently common at one time in Malacca territory, in Singapore, Penang, and the neighbourhood of Klang, but no specimens have come to hand of recent years, though it is one of the species I have always kept a special look out for.

31. CHRYSOCOLAPTES VALIDUS (TEMM.).

A pair of the Golden-backed Woodpecker.

32. NYCTIORNIS AMICTA (TEMM.).

Two males of the Red-bearded Bee-eater.

33. RHOPODYTES SUMATRANUS (RAFFLES).

A female of the Sumatran Green-billed Malkoha. Very rare in Selangor, but evidently commoner further south. More of a jungle species than either of its congeners, *R. diardi* and *R. tristis*.

34. ARGUSIANUS ARGUS (LINN.).

A female of the Argus pheasant. Was snared in a jerat. It is barely separable from a female of the allied form *A. grayi* from Sarawak.

BATRACHIA.

1. MEGALOPHRYS LONGIPES (BLGR.).

Two specimens of this horned Toad. Hitherto only known from the Larut Hills, where it is very common, were captured hiding under dead leaves.

2. RHACOPHORUS LEPROSUS (TSCH.).

This rare Batrachian has only been captured on one previous occasion in the Malay Peninsula. Mr. Wray having captured seven or eight specimens ten or twelve years ago. The present specimen was captured on a tree trunk and when fresh had the phalanges beautiful coral pink.

3. Ixalus pictus (Ptrs.).

Two specimens have previously been captured in the Peninsula, one on Bukit Timah, Singapore, the other in the Larut Hills.

4. Bufo asper (Gravnh.).

Only noteworthy from the fact that it is thickly mottled above and below with crimson spots, probably a breeding livery.

5. Rana, sp.

Closely allied to *R. plicatella*, *Stol.*, but presenting certain marked differences.

A CORRECTION.

THE following letter by Sir Daniel Morris, K.C.M.G., D.Sc., Imperial Commissioner of Agriculture in the West Indies, has long remained unpublished, as, for reasons stated elsewhere, there has not been a number of the "Perak Museum Notes" issued since it was written. This periodical being in a way the continuation of the older one, it is thought advisable to print the letter here:

Royal Gardens, Kew,
30th June, 1898.

Dear Sir,—

I notice in the article in "Perak Museum Notes," Vol. 2, Part 2, page 116, Mr. Mathieu quotes me as having stated that "filasse, the finished fibre (of Ramie), was worth £14 per ton." I may at once say that I have nowhere made any such statement. What I did say was that the filasse, a finished fibre, obtained from 15 or 20 tons of green stems, might be worth that sum. In other words, that the filasse obtained from one acre, assuming that area to produce under favourable conditions, 15 to 20 tons of green stems, would be worth £14. This would be at the rate of £42 per ton of filasse.

I should be glad if this correction could appear in the next issue of the "Notes."

Very sincerely yours,
D. MORRIS.

To L. Wray, Esq.

NOTE ON A SAMPLE OF COAL FROM UPPER PERAK.

By L. WRAY.

IN February of 1904 a sample of coal was sent to the Perak Museum for examination and report; a portion of it was added to the mineral collection and is now on view. This coal was said to have been found by some Chinese tributers working an alluvial tin mine belonging to Mr. D. Pasley, at Ayer Jeddah, near Kuala Kenering.

The sample weighed about two pounds and consisted of one large lump and several smaller ones. The coal is compact in structure,

hard and very tough. It breaks with a more or less conchoidal fracture, varies in colour from dead to shining black and does not soil the hands. Embedded in it are a few grains of waterworn quartz, but there is no rock in or attached to the specimen examined. It has a specific gravity of 1.334, so that a cubic foot of it would weigh, in round numbers, $83\frac{1}{4}$ pounds avoirdupois.

On heating, it burns with a good deal of flame but does not cake, so that the coke formed by it is in detached lumps, of the size and shape of the original pieces of coal before heating. On distillation in a retort it yields a considerable amount of gas of good illuminating power, and only traces of sulphur.

A commercial analysis gave the following figures:—

Fixed carbon—*i.e.*, weight of coke less ash ...	49.06
Volatile matters—*i.e.*, gas, tar, etc.	43.80
Ash	7.14
	100.00

The above results indicate a coal of very fair quality, that could be used for steam boilers and also for gas making, while its toughness and hardness show that it will stand transport well.

Some years ago Sir W. H. Treacher, K.C.M.G., presented to the Museum a sample of coal from Kedah. Although it is of very inferior quality, containing a large percentage of ash and much sulphide of iron, there is a certain resemblance between the two samples.

In April I visited Upper Perak, and took the opportunity of going to see Mr. Pasley's mine. It is situated in the small valley of the Ayer Jeddah, a tributary of the Kenering, about four and a half miles from Kuala Kenering. The mine-hole where the coal was said to have been dug up was full of water and no other working afforded an opportunity of examining the rocks of the locality. There were many pieces of rock containing graphite to be found in the refuse of the wash-dirt. These were as a rule much waterworn. The lumps of coal which have been found, were, on the other hand, all sharp and angular and show no signs of having travelled. Beyond the fact that granitic rocks appear in the bed of the stream and that the hill on the western side of the valley is composed of some stratified rock, there is nothing to be made out; and until some prospecting work is done it would be unwise to hazard any conjectures respecting this interesting discovery.

REPORT ON THE PERAK MUSEUM, 1903.

GROUNDS.

THE large ditch at the back of the Museum grounds was straightened and in part the sides were walled up. A new culvert was built across Museum Road to take the water by a short cut into the old ditch dividing the grounds of the Curator's quarters from those of the Treacher Girls' School.

BUILDING.

Hill's casement stays have been fitted to the windows in the Zoological and Ethnological rooms. Some broken squares of glass in some of the windows and doors have been replaced and eight of the blinds to the windows in the Ethnological room renewed. The passage leading from the Zoological to the new Ethnological rooms was floored with marble from the Ipoh quarry.

CASES.

The 18 wall cases for the lower room of the new Ethnological annexe were built, painted inside and glazed with plate glass. These cases have a total length of 160 feet and cover the two longer walls of the room. Twenty of the wall cases in the upper room were glazed and they were painted and varnished. Half of one of the table cases in the lower room was also glazed with plate glass.

The amount expended on the woodwork was	$ 990.00
On plate glass	1,552.29
And on paint, varnish, iron-work and fittings	497.87
Making a total of	3,040.16

An extra sum of $1,425, making the Museum expenses vote $4,000, was provided in the Estimates to meet the cost of case building. With the exception of a supplementary vote of $300 in 1902 and this sum of $1,425 the whole of the casing of these two rooms has been done out of the current expenses vote of $2,575. The 40 wall cases measure 346 feet in length and the 18 table cases have an area of 736 square feet. In the central gallery 26 hasps and staples were fitted to the table cases and brass handles were fixed to 18 of the wall cases.

ZOOLOGY.

There were numerous additions to this department. Sir J. P. Rodger, K.C.M.G., presented a very fine specimen of the gigantic Japanese crab, *Macrochira koempferi*, and Mr. Hollywood gave a number of crocodiles and their eggs. One of 2 feet 6 inches in length was stuffed and three skulls of different aged animals of 8 feet 9 inches, 6 feet 9 inches and 4 feet 7 inches were prepared. Two skulls of adult tigers and two of young ones were set up. These skulls show the growth of the teeth very well. Mr. Logan presented the cast of a footprint of the supposed man-eater taken at Padang Rengas.

A few birds were stuffed, and a number of snakes and other reptiles were collected and preserved.

A mounted specimen of the Estuarine crocodile was presented to the Manchester Museum and another to the Leicester Museum.

A certain amount of taxidermic work was done for private persons during the year.

GEOLOGY.

A large collection for the general geological series was given by the Trustees of the British Museum of Natural History. The specimens were selected from the duplicates in the Museum, were worked out,

packed and sent out to Perak by Mr. L. Wray. A few specimens of rocks and fossils were also collected by him in England and forwarded to Perak.

With the specimens previously in the Museum these additions will make a fairly complete series, representing most of the geological formations.

MINERALOGY.

Many additions were made to this section; amongst which the most important were a collection of Cornish minerals presented by Mr. S. Wickett, of Redruth; five specimens given by Mr. C. Wray and 31 specimens collected by Mr. L. Wray in England. Several of the local minerals were polished and a white topaz and smoke quartz or cairngorm from Chenderiang were cut and make quite handsome stones.

BOTANY.

Forty-four mounted herbarium specimens were received from the Royal Botanic Gardens, Calcutta, for the herbarium. Two lengths of the giant bamboo from Bikut, Ulu Slim, were given by Mr. Chan Heang Thoy.

A sample of Para Rubber seed was sent to the Imperial Institute for examination and has since been favourably reported on by Professor Dunstan, the Director; a sample of the Malayan varnish was also submitted for examination. It is obtained from a tree belonging to the genus *Garcinia* and appears to be quite equal to the Japanese lacquer, but like it is very difficult to apply. It is possible that this gum may prove a valuable product if only a solvent for it can be discovered.

ETHNOLOGY.

Two specimens of the so-called "hat-money" of Pahang, a round rattan Malayan shield, a mounted stone axe and a mounted stone adze from New Guinea, a Hindu brass fork, four stone implements and one specimen of the most ancient form of Chinese money, in the shape of a knife, were collected in England by Mr. L. Wray to fill up gaps in the series of objects representing various subjects in this section.

A paper entitled "Notes on Dyeing and Weaving as Practised at Sitiawan in Perak," and a second on "The Malayan Pottery of Perak," were communicated to the Anthropological Institute by Mr. L. Wray and printed in the Journal of the Institute. Both papers were illustrated with photographs of articles in the Museum collections.

A series of photographs of natives of the Malay Peninsula were presented to the British Museum of Natural History.

HISTORICAL.

Two seals of the late Mantri of Larut, two obsolete seals of the Secretary to Government and one of the Land Office were presented by Government. Three old pattern Krupp guns and one Nordenfelt machine gun were given by the Commandant, Malay States Guides. Sir F. A. Swettenham, K.C.M.G., presented a very interesting collection of old photographs.

LIBRARY.

Ten volumes were purchased out of the vote of $100 provided in the Estimates for this purpose and added to the Library.

Jan., 1905.

A number of books were presented, amongst which may be mentioned fifteen works by Mr. H. Ling Roth, given by the author. Fifty-five books were lent to readers during the year.

GENERAL.

A considerable number of new labels of various sizes were typewritten and mounted on cards.

The whole of the floors in the older portions of the building were cleaned and earth oiled.

LIST OF DONORS TO THE PERAK MUSEUM DURING THE YEAR 1903.

The Assistant District Officer, Larut
Mr. H. F. Bellamy
The British Museum of Natural History
The Director, Royal Botanic Gardens, Calcutta
Mrs. Caulfeild
Mr. G P. Cerruti
The Director, Royal Botanic Gardens, Ceylon
Mr. Chan Heang Thoy
Mr. J. Clarke
His Excellency the High Commissioner
The Divisional Engineer, Perak and Province Wellesley Railway
Mrs. Douglas
Mr. W. C. Ephraums
Captain S. S. Flower
The General Manager, F.M.S. Railways
The Government Printer, Perak
Mr. Gowland
Mr. M. J. Hollywood
The Trustees of the Indian Museum
Mr. D. Keilich
The Director, Royal Gardens, Ohio, U.S.A.
Mr. C. J. Lloyd
Mr. J. H. Logan
The Editor of the "Louisiana Planter"
The Director of the Manchester Museum
Mr. A. E. Marquis
The Missouri Botanical Gardens
The National Museum, Montevideo
Mr. D. Q. W. Pasley
The Committee of the Plymouth Museum and Art Gallery
The Publisher, "Perak Pioneer"
The Curator and Librarian, Raffles Museum, Singapore
The Resident-General, F.M.S.
Sir, J. P. Rodger, K.C.M.G.
Mr. H. Ling Roth
The Curator, Sarawak Museum
Miss H. Sayers
The Secretary to Resident, Perak
The Curator, Selangor Museum
Mr. J. N. Sheffield
The Publisher, "Singapore Free Press"
The Smithsonian Institution
Mr. F. A. Stephens
The State Surgeon, Perak
Sir Frank A. Swettenham, K.C.M.G.
The Traffic Manager, F. M. S. Railways
The United States National Museum
Colonel R. S. F. Walker, C.M.G.
The Commissioner, Imperial Department of Agriculture for the West Indies
Mr. S. Wickett
Mr. A. Wilson
Mr. D. C. Worcester
Mr. C. Wray
Mr. L. Wray, I.S.O.
Mr. S. Youshiwara

VISITORS.

The total number of visitors recorded during the year was 46,685. The museum was open to the public on 293 days, so that the daily

average attendance was 159. The maximum number of persons admitted in any one day was in February when 851 were recorded, and the greatest number in a month was also in February when 4,640 persons passed the turnstile.

STAFF.

Mr. L. Wray, the Curator and State Geologist, was on leave the whole of the year and Mr. E. Keilich, the Taxidermist, acted for him.

FINANCIAL.

The revenue collected amounted to $211.56. A saving of $1,906.30 was effected on the Estimates, exclusive of Establishments.

L. WRAY,
Curator and State Geologist.

REPORT ON THE SELANGOR MUSEUM, 1903.

Committee.—The Committee at the commencement of the year consisted of the following gentlemen—viz.,

Mr. W. G. Maxwell (*Chairman*).

Mr. A. M. Burn-Murdoch	Mr. B. E. Shaw
,, C. W. Hewgill	,, H. C. E. Zacharias (*Ex-Officio*)

In April, Messrs. Maxwell and Hewgill resigned their seats, on departure from the State, and Mr. B. E. Shaw was appointed Chairman. On 21st August Mr. C. W. Daniels, B.A., M.B., M.R.C.S., Mr. C. F. Leicester, M.B., C.M., Mr. E. V. Carey and Mr. J. H. Pye were added to the Committee. Meetings were held on 30th March, 30th April, 1st July and 18th November.

Curator.—Mr. H. C. E. Zacharias continued to act as Curator until 12th November, when I arrived in the State, and the report for this year must therefore be somewhat formal.

EXPENDITURE.

The annual vote of $4,000, for salaries and purchase of materials, was spent as follows:—

1.	Salaries of subordinate staff	$1,380.35
2.	Books and periodicals	830.50
3.	Preservatives and collecting materials ...	509.24
4.	Furniture and repairs	309.87
5.	Purchase of specimens	194.00
6.	,, of control clock...	82.00
7.	,, of type-writer	136.60
8.	Postage, transport and sundries	137.43
9.	Collecting trips	53.39
10.	Purchase of scientific apparatus	137.54
	Total ...	$3,740.92

The purchase of a control clock ensures the proper patrolling of the Museum at night and is also a check on the punctuality of the staff in the absence of the Curator. Item 10 includes the cost of a set of anthropometrical instruments as designed by Dr. Garson of the Home Office, which will be used for obtaining a series of physical measurements of the various races inhabiting the State.

VISITORS.

The number of visitors during the year 1903 amounted to 33,409, a decided falling off from the total for 1902, which was 42,956, an abnormal increase on the previous year, due to the exceptional number of public holidays and to a change in the hours during which the Museum was open to the public.

The percentage distribution according to race was as follows:—

	1901.	1902.	1903.	Population of Kuala Lumpur, 1901.
Europeans ...	1.3	1.2	1.3	3.2 (Europeans and Eurasians)
Eurasians ...	5.1	2.8	2.5	
Bengalis ...	3.7	4.1	3.2	13.7 (Bengalis and Tamils)
Tamils ...	18.4	19.7	16.5	
Malays ...	29.5	27.2	22.7	11.5
Chinese ...	42.0	45.0	53.1	71.6
	100.0	100.0	100.0	

It is evident that if account be taken of their proportion to the whole population, a larger number of Malays visit the Museum than of any other nationality, and that the Chinese attendance is really less than that of any other section of the community, while European interest appears to be almost negligible.

ADDITIONS.

(*a*) *Zoological.*

Owing to the absence, during the greater portion of the period, of a permanent Curator, the acquisitions have been unimportant. A considerable collection of Bornean animals was offered for sale and purchased as it contained numerous species known to occur in the Peninsula, but not represented in the Museum. A commencement was made with the formation of a fresh collection of lizards and several rare and interesting species were secured within a radius of a few miles from Kuala Lumpur. Amongst these may be mentioned a large species of flying lizard (*Draco maximus*) hitherto only known from Borneo and a large undescribed toad of brilliant coloration.

The only noteworthy mammal obtained was a single individual of the rare pentailed tree shrew (*Ptilocercus lowii*), which was previously supposed only to inhabit Borneo and the Natuna Islands.

About 500 specimens of insects of various orders were collected, but some time must elapse before any of the invertebrates can be adequately dealt with, as storage room and suitable cabinets, which in this climate must be of the finest construction and which are therefore correspondingly costly, are at present altogether lacking. It is hoped that this deficiency may be in part made good by the end of the year.

(b) *Ethnographical.*

There have been only some half a dozen additions in this department, including a Sakai sumpitan and quiver from Ulu Langat, a kris from the same locality and a finely embroidered Malay sleeping mat from Kuala Selangor.

CONSERVATION.

The state of repair of the Museum buildings has been so bad during the last two or three years that despite all that could be done by the Museum staff the collections have suffered considerably from damp and other causes. Those specimens that have been preserved in alcohol are now in a very indifferent condition, owing to the fact that they have mostly been stored either in corked bottles or in jars of German manufacture which are not provided with accurately-ground stoppers and which therefore permit the rapid deterioration of the preservative fluid.

HERBERT C. ROBINSON,
Curator.

F.M.S. Government Press.

No. 2.] [Vol. I.

JOURNAL

OF THE

FEDERATED MALAY STATES MUSEUMS.

TAIPING & KUALA LUMPUR, APRIL, 1905.

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NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

Copies may be obtained on application at the Perak or Selangor Museum, and at the Government Printing Office, Kuala Lumpur.

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J. Green del et lith. Mintern Bros. imp.

1. IXALUS CASTANOMERUS. 2. IXALUS VERMICULATUS.

DESCRIPTION OF A NEW FROG OF THE GENUS *IXALUS* FROM SELANGOR.

By G. A. BOULENGER, F.R.S.

IXALUS CASTANOMERUS, *sp. nov.*

(Pl. IV.)

HEAD rather large, a little broader than long; snout obtusely pointed, as long as the diameter of the orbit; canthus rostralis distinct; loreal region concave; nostril a little nearer the end of the snout than the eye; interorbital space as broad as the upper eyelid; tympanum slightly distinct, two-fifths the diameter of the eye. Fingers quite free; toes half webbed; disks of fingers a little larger than the tympanum; sub-articular tubercles moderate; a small inner metatarsal tubercle. The tibio-tarsal articulation reaches the tip of the snout. Upper parts finely shagreened; throat, belly and lower surface of thighs granulate. Greyish white, with a large darker grey blotch covering the greater portion of the back and extending T-shaped to between the eyes; this blotch, which is speckled with black, with sharp, concave outline on each side; upper lip and loreal and temporal region with dark marblings; limbs with oblique dark cross-bands; sides of thighs and lower surface of tibiæ chestnut-brown; lower parts whitish, with brown network.

From snout to vent, 32 millimetres.

A single specimen, a female, from Bukit Kutu, Selangor, 3,500 feet, presented to the British Museum by the Curator of the Selangor State Museum.

This new species is very closely allied to the *Ixalus vermiculatus*, Blgr. (Ann. Mag. Nat. Hist. (7) vi. 1900, p. 187), discovered a few years ago in the Larut Hills, at an altitude of 4,000 feet. This *I. vermiculatus*, which is figured alongside the new frog, differs in the more rounded snout, the more distinct tympanum, the rudiment of a web between the fingers and in the coloration.

NOTES ON THE SUGAR CANE RAT, *MUS JALORENSIS*.

By L. WRAY.

AT the request of the Hon. John Turner, M.L.C., Administrator and Attorney of the Penang Sugar Estates Company and Straits Sugar Company, I went to Lower Perak to superintend the administration of "rat virus" obtained from the Pasteur Institute, on the Rubana and Nova Scotia Estates, in September of 1904.

HISTORY OF THE RAT PLAGUE ON THE SUGAR ESTATES.

Rubana Estate is situated on the right bank of the Perak River and is about six miles below Telok Anson, in Lower Perak. It was opened some five years ago as a sugar estate. The rats, however, have proved so destructive to the growing canes that, as far as the cultivation of sugar is concerned, the estate has been practically abandoned. There were previously about 70 acres of padi fields near the estate and the rats were such a pest on them that the Malays were forced to desert them. It is believed that the rats from the padi fields came into the estate and, finding plenty of food, rapidly increased in numbers until the sugar had also to be abandoned.

Nova Scotia Estate, which is on the left bank of the river, immediately opposite Rubana, is now also being very seriously damaged by rats. It is reported that the rats swam across the Perak River in a body from one side of the estate to the other, but considering the width of the river and the strength of the current, it is more probable that they came from the jungle in the first instance and have been increasing and multiplying in the fields ever since. A certain number may have been brought over the river in the barges with the canes, for the mill is on the Nova Scotia side of the river, and all the canes were taken over in barges to be crushed.

The manager of the two estates, Mr. S. Anderson, informed me that last year over 300,000 rats were caught by the coolies for a reward of so much per head, without making any appreciable difference to the numbers present in the fields.

THE NATURE OF THE DAMAGE DONE TO THE CANE FIELDS.

The extent of the damage done to the canes by the rats is not to be measured by the amount they eat but by the amount they destroy. They begin their ravages when the canes are about three feet or so high, that is when a portion of the cane is showing below the growing shoot and the leaf stalks. They then gnaw the cane in one or more places, usually on one side only and always between the joints. The result is that the cane bends at the injured place and finally withers and dies or breaks off. A single cane may have as many as eight holes in it or there may be only one. The part of the cane chosen may be near the ground or quite at the top; for the rats can climb almost as well as squirrels and no part of the cane is inaccessible to them.

When many rats are in a field it assumes a very ragged appearence, from the bent and broken canes falling over beteen the rows. In bad cases, I was informed, a field is so damaged as not to be worth the expense of cutting and milling. For, as well as causing the canes to bend and break, when a rat has gnawed a cane, fermentation sets in and the inside of the cane begins to become discoloured and sour. In most cases this change starts from the central portion of the cane and enlarges outwards until the whole inside of it is involved. Meanwhile the cane may externally appear quite sound, showing perhaps only one small hole gnawed in it. Naturally canes in this condition are of little good for sugar making.

THE KIND OF RAT RESPONSIBLE FOR THE DAMAGE.

One branch of the enquiry was directed towards the determination of the species of rat causing the destruction of the sugar canes. A large number of the animals were trapped and caught by the coolies on the two estates. The result of an examination of them was that there appeared to be only two or three kinds of rats present. These may be separate species or perhaps only varieties of one species. As a large series of skins was made, this question can ultimately be settled when they have been examined and compared with the types.

In the meantime they may be differentiated as: *A*, a rat having the underparts white, probably *Mus jalorensis*; *B*, a rat having the underparts yellowish-brown; and *C*, a rat having the underparts brown, this latter rat was on a previous occasion identified by Mr. Oldfield Thomas as *Mus rattus*.

Variety *A* is a field rat, for in only one case was an individual caught in a house, and that was the Sugar Mill, an open building. This is the rat which does the damage to the sugar canes.

Varieties *B* and *C* were caught either in the houses or in the cane fields immediately adjoining the houses. All the specimens came from Nova Scotia; out of over sixty captured on Rubana there was not a single example of either *B* or *C*. These rats have probably been introduced from the town, *C* being the common house rat of Perak.

A very large rat is reported to be occasionally met with on the estates, but this animal appears to be quite rare. No mice were caught, either in the houses or fields.

HABITS OF THE RATS.

The habits of the field rat *A* are much like those of other rats. It lives in the fields in burrows made in the ground, also beneath roots of tree stumps and logs of timber. It retires to these holes in the day-time and comes out at night to feed. It makes nests of grass and leaves in these burrows and brings up its young in them. One litter brought in numbered eight and another six, but doubtless these numbers are often exceeded.

It is the practice to burn off the fields after each crop of canes is harvested, but I was informed that this does not kill the rats, who only burrow down a little deeper into the earth and thus escape the effects of the fire. They can swim well and so are able to cross the canals with which the estates are intersected. In fact, when chased they usually take to the water if there is any near.

From the above, it will be apparent that the rats are permanent inhabitants of the cane fields. It is also easy to see that when a few get into a field, as they have four or more litters per year of from six to a dozen each, it does not take long for it to be stocked with these destructive little rodents.

In captivity they sleep most of the day and are very active at night. They get together into a sort of heap to sleep. Ten or more will all lie one on the top of the other and if only two are put in a cage

together they always sleep one more or less over the other. This gregarious method of sleeping would therefore appear to be a habit with them and they probably so sleep in their burrows in the field. This would account for the great numbers which are often unearthed from a single hole.

They sometimes kill and eat one another when kept in captivity. In one case seven young rats were being kept in a cage and one of the number was killed and eaten by the others. How far this trait holds good in the natural state it is impossible to say, but, from quite young animals practising it, it is more than probable that sick or wounded ones are eaten by their companions. They do not, however, appear to be quarrelsome when caged together, though on one occasion a dead adult female was found after a fight in one of the cages. They soon became reconciled to captivity and got quite tame, though they would bite if given the chance. They are very nervous and timid and would cry out and stand up on their hind legs at the back of the cage if frightened.

The brown-bellied rats appear to be much more fierce. One caught in a trap seriously hurt itself in frantic attempts to get through the wires. The field rats have extremely sharp teeth and in many cases bit holes through the brass wire gauze of which the cages were made.

FORMER ATTEMPTS TO DESTROY THE RATS.

Many things have been tried to lessen the numbers of the rats. Amongst these may be mentioned the mongoose. About a thousand of these fierce little animals were imported and let loose on the estate, but they appear to have all gone away into the jungle and done no good in killing the rats. Wire netting was also tried, but as the rats can climb this material with the greatest ease and can even run along on the under surface of a piece of it when held up horizontally, this likewise proved of no avail. The killing of them at the rate of over 800 per day has been already mentioned.

PREVIOUS EXPERIMENTS WITH LOEFFLER'S TYPHI-MURIUM BACILLUS.

I was informed by Dr. M. J. Wright, the State Surgeon, Perak, that the rat virus had been previously tried on the rats on an estate in Lower Perak, and he very kindly allowed me to see his office copy of the correspondence relating to the experiment. From this paper, R.-G.O. 5011/1900, it appears that in 1900 two tubes of the virus were received through the Director of the Institute for Medical Research, Federated Malay States. They were unfortunately both broken in the post and arrived in Lower Perak in a dried and mouldy condition. The contents of the tubes were, however, put on bread and placed in the fields at Bagan Datoh Estate. Dr. J. T. Clarke, District Surgeon, Telok Anson, who conducted the experiments, writes that the results were negative, and it is quite probable, as he suggests, that the bacillus was dead at the time it arrived.

Another consignment was asked for, but Dr. Hamilton Wright, the then Director of the Institute for Medical Research, Kuala Lumpur, reported in November of 1901 that "a further supply is not available" and that "extensive experiments have been conducted in England and United States to test the usefulness of it. The reports sent in are all adverse and unless there is some special reason I do not advise that any more be procured."

RECENT REPORTED SUCCESS IN EUROPE.

Since the date of Dr. Hamilton Wright's letter, this mode of destroying rats appears to have been successfully accomplished in Europe, for in the "Pharmaceutical Journal" of 7th May, 1904, it is stated, "The French Government recently instituted a series of experiments, with the aid of the Pasteur Institute, and have now succeeded in making a poison, known by the name of the discoverer, Dr. Danysz, which, it is claimed, is fatal to rats and voles. . . . . With the object of encouraging the use of this method of destroying the pests, the French Government have voted the sum of 350,000 francs (£14,000), which is calculated to be a third of the amount necessary for treating the infested districts."

THE RECENT TRIAL IN PERAK.

The Directors of the Straits Sugar Company sent out from the Pasteur Institute a large consignment of the virus prepared by Dr. Danysz. It was of two kinds, the one being a culture in broth and the other in gelatine.

The cases arrived in Singapore by the French Mail on the 7th September and reached Teluk Anson on the 9th. On the 12th I examined the virus and it appeared to be in good condition.

The broth culture had a pale yellowish colour and was slightly cloudy, it had a very disagreeable putrescent smell and was slightly acid to test paper. Under the microscope the fluid was seen to contain long, thin, more or less curved rods, some being jointed, and other shorter rods, the whole of them being motile.

The gelatine in the test-tubes had been set on the slant and was still solid. It was of a yellowish-brown colour, cloudy, and most of the tubes had a greyish-brown sediment. In some tubes there was a slight smell resembling that of the broth. The gelatine was neutral to test paper. Under the microscope there appeared many short rods, more resembling cocci, which were not motile, but this was to be expected in a solid medium.

Several tubes of nutrient agar-agar, which had been previously prepared and sterilized, were inoculated by a platinum needle with both the gelatine and the broth cultures. After about 30 hours at the room temperature, growths appeared along the needle track and on the surface of the jelly. A number of tubes were inoculated, from time to time, from different bottles and tubes of the virus. The nature of the growth was the same in all but one of them. This was

doubtless due to the bottle of broth from which it was inoculated having been infected by some other bacterium. Cultivations were made from these again and grew in the same way. A second culture from gelatine, in a ten ounce flask of agar-agar, gave also what appears to be the characteristic smell.

From the above experiments it is reasonable to suppose that the virus, as received, was alive and active, as it was capable of starting new growths and in only one case was contaminated by some other organism. It of course is possible that although alive, its power of producing disease may have been modified or even lost, but in the absence of animals known to be susceptible to the virus, to experiment on, this point could not be determined.

EXPERIMENTS ON RATS.

On the 12th September three of the field rats were fed on bread soaked in a mixture of the gelatine and salted water, in the proportion of 10 tubes of the culture in gelatine to one litre of water and one teaspoonful of salt. Three other rats were fed on rice which had been steeped in broth culture diluted with salt water, in the proportion of one bottle, of 900 c.c., of broth to nine litres of water and nine teaspoons of salt.

These rats were each put in a separate cage and fed on sugar-cane and boiled rice. Up to the 27th September, the date of my leaving the estate, they remained in perfect health. The incubation period, given in the letter accompanying the virus, is fourteen days.

The virus was fed to other rats on the 13th and 14th and several other dates. One rat was also fed on bread on which the undiluted gelatine was spread and another with bread soaked in the undiluted broth. In the foregoing experiments rats of all ages and both sexes were used, and none of them showed any ill effects from the treatment.

Two rats were given a subcutaneous injection, by means of a hypodermic syringe, of a mixture of sterilized water and about 15 per cent. of the gelatine culture, taken from two tubes. The rats were chloroformed and the injection made near the root of the tail, one receiving two minims and the other four minims of the fluid. The result of this experiment was also negative, as it had no effect whatever on the rats, either locally or constitutionally.

APPLICATION IN THE FIELD.

From the 12th to the 25th September, infected food was laid in the fields. Bread, rice and Chinese green peas were used, soaked in both the broth and gelatine virus, diluted as directed. About 25 per cent. of the baits were found to be eaten in the morning after laying. Nothing happened, however, and after the lapse of the 14 days the distribution was stopped. As it was stated that the virus would only keep a short time after arrival, it was thought to be advisable to begin the use of it in the field before the experiments on the caged rats were concluded.

CONCLUSIONS.

The only deductions to be drawn from the above detailed experiments are, (*a*) that the virus arrived here in good condition, but (*b*) that the field rats of Perak are not susceptible to its action.

It would appear from a paragraph in the "Pinang Gazette," of 20th September, that the same virus has been tried recently on field rats at Buitenzorg, in Java, but failed there also, owing to the rats being immune.

Taiping, *10th October, 1904.* L. WRAY.

A SYNOPSIS OF THE BIRDS AT PRESENT KNOWN TO INHABIT THE MALAY PENINSULA SOUTH OF THE ISTHMUS OF KRA.

By HERBERT C. ROBINSON, M.B.O.U.,
Curator, Selangor State Museum.

NO general work existing, which deals specially with the birds of the Malay Peninsula and its dependencies, it is intended, in this and subsequent numbers of the "Journal of the Federated Malay States Museums," to give a brief account of every species at present known to occur within the limits indicated above. As, however, a full description of every variety would occupy a greater amount of space than is available, it has been thought sufficient to give a "key" to each main group, which it is hoped will enable anyone interested in the subject to identify all birds that he is at all likely to come across, while the list of books and pamphlets given below, most of which are available for reference in the library of the Selangor Museum, will enable him to pursue the subject further, should he so desire.

The lists of Peninsular localities are mainly taken from the collections of the British Museum, the Perak, Selangor and Singapore Museums and from those of the Hon. W. Rothschild at Tring. East coast localities, north of Pahang, are derived from the collections of the "Skeat Expedition," now preserved at Cambridge, and from that made by Mr. Annandale and myself, the bulk of which is now in the British Museum.

It should be pointed out, however, that there are large tracts regarding which our knowledge is almost a blank, such as the States of Trengganu and Nakawn on the east coast and those north of Kedah on the west, as well as large portions of Kelantan and Pahang. Information and collections from any of these localities will be most acceptable.

LIST OF AUTHORITIES CONSULTED.

1. Catalogue of the Birds in the British Museum, vols. i.-xxvii., London, 1874-1898.

    Contains the descriptions of, and diagnostic keys to, all species known to science at the dates of publication of the respective volumes.

2. Hand-list of Birds, by R. B. Sharpe, vols. i.-iv., London, 1899-1903,

A British Museum publication, supplementary to the preceding, containing the names of all known species of birds and their geographical distribution, together with references to the original descriptions of all species discovered since the issue of the corresponding volume of the "Catalogue."

3. The Fauna of British India including Burma and Ceylon: Birds, vols. i.-iv., by Messrs. Oates and Blanford. London, 1889-1898.

A systematic account of the Birds of the Indian Empire A very large proportion of Malayan birds occurring also in Tenasserim this work is most useful to students of the local avifauna.

4. "Stray Feathers," a Journal of Ornithology for India and its Dependencies, edited by A. O. Hume, vols. i.-xi. Calcutta, 1873-1888.

Contains scattered references to, and descriptions of, Malayan birds. The only important papers as far as this fauna is concerned are contained in the volumes for 1879 and 1880.

5. Kelham, H. R. Ornithological Notes made in the Straits Settlements and in the Western States of the Malay Peninsula. *Ibis*, 1881, pp. 362-395; 501-532; *op. cit.* 1882, pp. 1-18; 185-204.

Contains interesting field-notes on most of the commoner species. (Reprinted in *Journ. Straits Branch Royal Asiat. Soc.*, ix. pp. 109-140 (1882); *op. cit.* xi. pp. 1-29; *op. cit.* xii. pp. 172-295 (1883).

6. Sharpe, R. B. Notes on some Birds from Perak. *Proc. Zool. Soc., London,* 1886, pp. 350-353.

7. Sharpe, R. B. On a second Collection of Birds formed by Mr. L. Wray in the Mountains of Perak, Malay Peninsula. *Proc. Zool. Soc., London,* 1887, pp. 431-447, pls. xxxvii, xxxviii.

8. Sharpe, R. B. List of a Collection of Birds made by Mr. L. Wray in the main Range of Mountains of the Malay Peninsula, Perak. *Proc. Zool. Soc., London,* 1888, pp. 268-281, pl. xv.

These three papers form one of the most important contributions to our knowledge of the avifauna of the Malay Peninsula, as showing that the higher mountains are inhabited mainly by species of Himalayan and Sumatran affinities. Reprinted in *Journ. Straits Branch. Roy. Asiat. Soc.* xix. pp. 125-141 (1888); op. cit. xxi. pp. 1-18 (1890).

9. Ridley, H. N. List of birds collected or observed during a trip in Pahang. *Journ. Straits Branch Roy. Asiat. Soc.* xxv. pp. 60-65. (1894).

A nominal list of 124 species obtained or noted during an attempt to ascend Gunong Tahan.

10. Ridley, H. N. Birds in the Botanic Garden, Singapore. *Op. cit. supra,* xxxi. pp. 73-89 (1898).

11 Butler, A. L. Birds of the Larut Hills. *Op. cit. supra*, xxxii. pp. 9-31 (1899).

A list, with field-notes, of 113 species.

12. Hartert, E. and Butler, A. L. Notes on Birds from Perak. *Nov. Zool.* v. pp. 506-8 (1898).

Contains descriptions of three new forms, which are also included in the preceding paper.

13. Bonhote, J. L. On the Birds collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. *Proc. Zool. Soc., London*, 1901 (i.), pp. 57-81.

Enumerates 139 species none of which are new to science, mostly from the east coast States, though a few were collected in Kedah and on Gunong Inas in northern Perak.

14. Hartert, E. On Birds from Pahang, Eastern Malay Peninsula. *Nov. Zool.* ix., pp. 537–580 (1902).

A list of 196 species from the neighbourhood of Gunong Tahan, including, however, many from the lowlands of Kelantan and Pahang. Several species are described as new, amongst them a remarkable bullfinch and a form of the Tonquin Argus Pheasant (*Rheinardius ocellatus nigrescens.*)

PART I. THE PIGEONS.

The Pigeons and Doves form a well-marked group, which can be recognised by anyone without the slightest knowledge of ornithology. The only other birds with which they might possibly be confused are one or two of the game birds, from which they may be separated by possessing a "cere" or covering of soft skin at the base of the bill, in which the nostrils are situated.

No species is peculiar to the Malay Peninsula, which is the meeting place of two distinct zoological regions, many Indian species here finding their eastern limit, while others from Java, Borneo and Sumatra do not extend further west.

Species which are represented in the Perak Museum have an asterisk attached, while those of which the Selangor Museum possesses specimens are marked with a dagger.

KEY TO THE SPECIES.

A. Large birds with the wing more than 8.2 inches in length; tail square—

a. With elongated hackles on hind-neck — *C. nicobarica* — p. 49

a[1]. Feathers on hind-neck, normal.

b. General colour above, bronzy-green — *C. aenea* — p. 50

b^1. General colour above, maroon—

1. Feathers of rump uniform with back ... ... *C. badia* p. 50
2. Feathers of rump grey ... *C. punicea* p. 55

b^2. General colour above, liver-brown *C. griseicapilla* p. 51

b^3. General colour ivory white, wings and tail black ... ... *M. bicolor* p. 51

b^4. General colour grey, wings and tail black ... ... *C. grisea* p. 55

B. Smaller birds, wing never more than 8 inches—

c. Always with non-metallic green in the plumage—

1. Tail graduated ... ... *S. korthalsi* p. 51
2. Tail square.

d. Top of head, chin and patch on breast magenta ... ... *P. jambu* p. 51

d^1. With no magenta in plumage.

e. Wing exceeding 7 inches, bill thick ... ... *B. capellei* p. 52

e^1. Wing less than 7 inches.

f. Bill thick; swollen towards tip ... ... *T. nipalensis* p. 53

f^1. Bill slender; not markedly swollen towards tip.

g. Wing less than 5 inches *O. olax* p. 53

g^1. Wing more than 5 inches.

h. Feathers of the thighs uniform bright yellow in both male and female; male with head, breast and neck chestnut, female with the top of the head grey *O. fulvicollis* p. 54

h^1. Feathers of the thighs mingled with green; males with breast vinaceous succeeded by an orange patch; females with the head uniform green.

j. With a narrow grey tip to tail ... ... *O. vernans* p. 53

j^1. With a broad grey tip to tail ... ... *O. bicincta* p. 54

c^1. Always with metallic bronzy green in the plumage ... ... *Ch. indica* p. 56

c^2. With no green whatever in the plumage—

- *k*. Feathers of the hind-neck bifurcate, checquered black and white ... *T. tigrinus* p. 57
- k^1. Feathers of the hind-neck normal.
  - *l*. Outer tail feathers broadly tipped with white.
    - *m*. Sides of the neck, breast and flanks white with narrow black bars ... *G. striata* p. 56
    - m^1. Sides of the neck, breast and flanks unbarred ... *T. humilis* p. 56
  - l^1. Outer tail feathers not tipped with white.
    - *n*. Outer tail feathers grey, size large ... ... *M. leptogrammica* p. 54
    - n^1. Outer tail feathers rufous, size small ... ... *M. ruficeps* p. 55

† 1. *CALOENAS NICOBARICA*—THE NICOBAR PIGEON.

Caloenas nicobarica (Linn.); *Salvadori, Cat. Birds Brit. Mus.* xxi. p. 615 (1893); *Sharpe, Hand-list of Birds*, i. p. 91 (1899).

The Nicobar Pigeon is a heavily built bird, almost entirely terrestrial in its habits, only making use of its wings when hard-pressed. It has, however, been known to traverse stretches of sea exceeding one hundred miles. It is almost exclusively an inhabitant of small islands, where it frequents the brushwood near the shore, feeding on the ground and roosting at night in small trees.

Localities in the Peninsula.—The occurrence of this bird in a wild state anywhere on the mainland of Asia is open to very considerable doubt. The "Skeat Expedition" obtained a specimen at Khota Bharu, Kelantan, but it is highly probable that this was a cage-bird, originally from Pulau Redang or some more distant locality, these birds being frequently domesticated by Malays. The only authentic locality within the limits of the Straits Settlements is Pulau Jarak, a small island about thirty miles west of Pangkor in the Dindings, where two specimens were obtained by myself in December, 1904, the bird being by no means uncommon.

General Range.—From the Andamans and Nicobars throughout the islands of the Malay Archipelago, eastwards to New Guinea, New Britain and the Solomon Islands.

Mo. Bot. Garden
1907

*† 2. *CARPOPHAGA AENEA*—THE GREEN IMPERIAL PIGEON.

Carpophaga aenea (Linn.); *Salvad. t.c.*, p. 190; *Sharpe, t.c.*, p. 64.

Widely distributed throughout the submontane and coastal districts of the Malay Peninsula, but not, so far as is known, ascending the hills to any great elevation. It is exclusively a fruit eater and usually flies very high, rarely descending to the ground. At certain times of the year it frequents the coastal creeks to feed on the fruits of a species of mangrove, when it becomes much bolder and large bags are often made, though it requires a quick eye and a heavy charge of shot to bring these birds down.

LOCALITIES IN THE PENINSULA.—Generally distributed along the western coast, including the island of Penang, but not hitherto recorded from Pahang or the east coast though it must undoubtedly occur there.

GENERAL RANGE.—Southern, Central and Eastern India, through Assam to Tenasserim and the Malay Peninsula, eastwards to Cochin China, Hainan and the Philippines. The Andamans, Sumatra, Java, Borneo and the lesser Sunda Islands as far as Flores.

MALAY NAME.—Pergam.

*† 3. *CARPOPHAGA BADIA*—COPPER-BACKED IMPERIAL PIGEON.

Carpophaga badia (Raffles); *Salvad. t.c.*, p. 218; *Sharpe, t.c.*, p. 67.

Common on the higher hills of the Malay Peninsula but rarely seen elsewhere, though at certain times of the year it appears to descend to the coast. It is by no means an easy bird to shoot, as it nearly always keeps to the ridges of the hills, except at early morning and late evening, when it may be seen flying high above the valleys from hill to hill, taking a very heavy charge of shot to bring down. Its call is a deep booming note, which carries a great distance and is usually heard for a short time in the early morning only. The nest is very similar to that of the English wood pigeon but is even less substantial. It is usually placed in small trees, close to the crest of a hill, ten or twelve feet from the ground, and very rarely contains more than one egg; which is regularly oval in shape, measuring about 43 by 32 mm. The shell is white, very slightly pitted and somewhat glossy. In Selangor the breeding season appears to be from December to February.

LOCALITIES IN THE PENINSULA.—Perak: Matang (*Wray*): Larut Hills (*Wray, Butler*): Batang Padang, Batu Puteh (*Wray*); Telom (*Robinson*); Selangor: near Klang (*Davison*), Bukit Kutu (*Butler*), Semangko Pass (*Robinson*), Mengkuang Lebir (*Robinson*); Pahang: Gunong Tahan, 5-9,000 feet (*Waterstradt*); Dindings, March (*Robinson*); Malacca.

GENERAL RANGE.—From the Mergui Archipelago (?) southward through the Malay Peninsula to Northern Borneo, Sumatra and possibly Java.

MALAY NAME.—Pergam bukit.

4. *CARPOPHAGA GRISEICAPILLA*—GREY-HEADED IMPERIAL PIGEON.

Carpophaga griseicapilla (Wald.); *Salvad. t.c.*, p. 217; *Sharpe, t.c.*, p. 67.

This species, which differs only from the preceding in its slightly larger size and in having the back and rump liver-brown, with only the very faintest tinge of maroon, has not hitherto been recorded from the Peninsula. A single specimen, shot at an altitude of 1,500 feet on Bukit Serudum, Kuantan, a district on the east coast of Pahang, by Mr. W. H. Craddock, late Deputy Conservator of Forests, Federated Malay States, has been identified as this species by Col. Bingham. The specimen should, perhaps, be more rigidly compared with the typical *C. badia* before *C. griseicapilla* is admitted to an authentic place in our faunal lists.

General Range.—From Manipur to Tenasserim.

*† 5. *MYRISTICIVORA BICOLOR*—THE PIED IMPERIAL PIGEON.

Myristicivora bicolor (Scop.); *Salvad. t.c.*, p. 227; *Sharpe, t.c.*, p. 67.

In the Malay Peninsula this species is absolutely confined to the islands and to the mouths of the rivers, where these are edged with mangroves, and is never seen more than two or three miles from the sea. It has not as yet been discovered on the east coast, though, doubtless, it exists there. It flies in large flocks, sometimes including as many as five hundred individuals, and is extremely local in its habitats, as its visits depend on the fruiting of particular trees.

Localities in the Peninsula.—Perak: Larut (*Wray*); Dindings: Pulau Jarak (*Robinson*); Selangor: Kuala Selangor (*Butler*); Jugra (*Robinon*); Malacca.

General Range.—From the Andamans and Nicobars through the Malay Archipelago to the Philippines and New Guinea. Siam and Cochin China.

Maly Name.—Rawa.

*† 6. *PTILINOPUS JAMBU*—THE PINK-HEADED FRUIT-DOVE.

Ptilopus jambu (Gm.); *Salvad. t.c.*, p. 80; *Sharpe, t.c.*, p. 56.

The Pink-headed Fruit Dove is now a decidedly rare and local bird throughout the more settled portions of the Peninsula, though it is doubtful if it was ever common in the northern districts, its reputed occurrence in Penang being founded on very insufficient evidence. It is largely a denizen of the mangroves fringing the coast and estuarine rivers, but at certain seasons it appears to travel inland and is not unfrequently found on the main range as high as 3,500 feet. In habits it is much more shy and retiring than the species of *Osmotreron* and is rarely found in parties of more than two or three, which are with difficulty seen in the high and densely foliaged trees that they affect, though, when on the coast, they are very much more in evidence. Nothing is known of the nesting habits.

Localities in the Peninsula.—Perak: Larut, Kinta (*Wray*); Selangor: Klang (*Davison*), Bukit Kutu (*Butler*); Negri Sembilan: Linggi River (*Robinson*); Pahang: Gunong Tahan, 1,500-4,000 feet (*Waterstradt*); Kelantan: Kuala Aring (*Skeat Expedition*); Malacca; Singapore.

General Range.—The Malay Peninsula, Bangka, Billiton, Sumatra and Borneo.

Malay Name.—Punai gading; Punai jambu.

*† 7. *BUTRERON CAPELLEI*—THE LARGER THICK-BILLED GREEN PIGEON.

Butreron capellei (Temm.); *Salvad. t.c.*, p. 32; *Sharpe, t.c.*, p. 53.

This species, the largest of the Green Pigeons of the Malay Peninsula, is more of a true jungle bird than any of its relatives. It is found throughout the low country forests on both sides of the Peninsula, but does not seem to ascend the mountains. It is met with in flocks of from ten to twelve to as many as forty and fifty, and in common with many other birds is especially fond of the fruit of the kayu ara, a variety of parasitic fig, which attains a very great height. Nothing is known of the nest and eggs.

Localities in the Peninsula.—Penang; Perak: Larut, Kinta, Batang Padang (*Wray*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*); Patani: Mabak (*Robinson*); Pahang (*Waterstradt*); Malacca; Johore (*Davison*).

General Range.—From the Mergui Archipelago, whence one specimen has been obtained, through the Malay Peninsula to Borneo, Sumatra and, doubtfully, Java.

Malay Name.—Berkok; Lengkuas.

8. *SPHENOCERCUS KORTHALSI*—THE WEDGE-TAILED GREEN PIGEON.

Sphenocercus korthalsi (Temm.); *Salvad. t.c.*, p. 11; *Sharpe, t.c.*, p. 52.

The Wedge-tailed Green Pigeon can readily be distinguished from all others by having the central tail feathers considerably longer than the lateral ones and somewhat acuminate. The male has a maroon patch at the angle of the wing and an ill-defined rufous band across the breast, the female is more or less uniform green.

There are six or seven members of this genus the females of which resemble one another very closely, so that it is possible that when males have been obtained the Malayan form will prove to be distinct from *S. korthalsi*, with which I have provisionally united it.

Localities in the Peninsula.—A single female specimen was shot on Gunong Mengkuang Lebir, at an altitude of 5,400 feet, on 4th April, 1905. The species has also been reported from "Malacca," but the report has been generally discredited. In view of the present specimen, however, it is quite possible that it occurs in the hills around Mount Ophir.

General Range.—Java and Sumatra, at considerable elevations.

*† 9. *TRERON NIPALENSIS*—SMALLER THICK-BILLED GREEN PIGEON.

Treron nipalensis (Hodgs.); *Salvad. t.c.*, p. 35; *Sharpe, t.c.*, p. 53.

Generally distributed throughout the Peninsula, but more common as a rule in thickly forested districts and near the main range. The species is evidently subject to periodical migrations, as in February, 1904, eleven birds killed themselves against the windows of the Semangko Pass Rest House.

LOCALITIES IN THE PENINSULA.—Perak: Larut (*Hartert, Butler, Wray*), Kuala Kangsar (*Kelham*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*), Semangko Pass, 2,700 feet (*Robinson*); Malacca; Johore; Singapore.

GENERAL RANGE.—From Nepal and the Eastern Himalayas southward through Burma and Tenasserim to the Malay Peninsula, Borneo, Sumatra and the Palawan group. Siam and Cochin China.

MALAY NAME.—Punai daun.

*† 10. *OSMOTRERON VERNANS*—THE PINK-NECKED GREEN PIGEON.

Osmotreron vernans (Linn.); *Salvad. t.c.*, p. 16; *Sharpe, t.c.*, p. 54.

This is the commonest Pigeon in the Peninsula and is probably familiar to nearly everybody. It is found nearly everywhere except in thick jungle, but its favourite haunts appear to be patches of small second growth, the banks of rivers, just where the mangroves are beginning to thin out, and the trees surrounding the rice-fields.

In the breeding season, which in Selangor is usually from December to March, it is solitary, but at other times of the year it flies in flocks of from ten to thirty individuals.

LOCALITIES IN THE PENINSULA.—Almost universal, except in the mountains and in very dense jungle.

GENERAL RANGE.—Siam, Cochin China and Tenasserim, the Malay Peninsula and nearly all the islands of the Archipelago, including Celebes and the Philippines.

MALAY NAME.—Punai.

*† 11. *OSMOTRERON OLAX*—THE SMALL GREEN PIGEON.

Osmotreron olax (Temm.); *Salvad. t.c.*, p. 64; *Sharpe, t.c.*, p. 54.

This variety can be at once recognised by its small size and by having the whole of the back, below the nape, rich maroon in the male. It is somewhat less widely distributed than the foregoing species and keeps as a rule to less open country, being found also in smaller flocks, which rarely exceed ten or fifteen in number. Its flight is less powerful and it is much more apt to trust for protection to the shade of the trees in which it feeds. I have often found it in the same tree with *Treron nipalensis* but it does not seem to associate with *Osmotreron vernans*. The egg and nest have not as yet been described.

Localities in the Peninsula.—Tonka; Province Wellesley; Penang; Perak: Larut (*Wray*); Batang Padang district (*Robinson*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*); Pahang (*Waterstradt*); Malacca; Johore; Singapore.

General Range.—From the north of the Malay Peninsula to Singapore, Sumatra, Borneo and, possibly, Java.

Malay Name.—Punai siul.

† 12. *OSMOTRERON BICINCTA*—THE ORANGE-BREASTED GREEN PIGEON.

Osmotreron bicincta (Jerd.); *Salvad. t.c.*, p. 57, *Sharpe, t.c.*, p. 54.

Precisely similar in habits to *O. vernans*, but of very rare occurrence in the Malay Peninsula and only in the west coast distiets.

Localities in the Peninsula.—Junk Ceylon (*Weber*); Selangor: Kuala Selangor (*Robinson*); Malacca.

General Range.—Eastern Himalayas, Eastern Central Provinces of India, through Assam and Burma to Cochin China and Hainan; Ceylon: Tenasserim and the Malay Peninsula.

Though somewhat resembling *O. vernans*, this species is readily distinguished by the absence of the pink patch on the nape in the male and by the green coloration of the forehead, chin and neck, these parts being grey in *O. vernans*; The females are differentiated by the broad apical tailband of *O. bicincta*.

*† 13. *OSMOTRERON FULVICOLLIS*—THE CINNAMON-HEADED GREEN PIGEON.

Osmotreron fulvicollis (Wagl.); *Salvad. t.c.*, p. 52; *Sharpe, t.c.*, p. 54.

Fairly common along the coast, especially in the winter months, but rarer inland.

Localities in the Peninsula.—Junk Ceylon (*Darling, Weber*); Perlis (*Darling*); Perak: Larut, Kinta (*Wray*); Dindings; Selangor (*Butler*), Klang (*Davison*), Morib (*Robinson*); Malacca; Johore.

General Range.—Southern Tenasserim, Malay Peninsula, Cochin China, Nias, Billiton and Southern Borneo.

Malay Name.—Punai bakau.

The male of this species is quite unmistakable and the female differs from those of the allied forms by having the top of the head dark grey.

* 14. *MACROPYGIA LEPTOGRAMMICA*—THE BAR-TAILED CUCKOO-DOVE.

Macropygia leptogrammica (Temm.); *Salvad. t.c.*, p. 340; *Sharpe, t.c.*, p. 73.

The Bar-tailed Cuckoo Dove is a very rare bird in the Malay Peninsula and is entirely confined to the higher hills. The only specimens as yet obtained are two shot by Mr. L. Wray on the Larut Hills and one on Gunong Batu Puteh. I have seen the bird on Gunong

Mengkuang Lebir, Selangor, 5,200 feet, and obtained its nest and eggs. The former is a flimsy platform of small twigs built in a tree, ten or twelve feet from the ground: the latter are pearly white, the shell slightly glossy and somewhat pitted; in shape they are regular ovals evenly pointed at both ends, measuring about 33 by 24 mm. The breeding season is December and January.

General Range.—The hills of Sumatra, Java and the Malay Peninsula.

*† 15. *MACROPYGIA RUFICEPS*—THE LITTLE MALAY CUCKOO DOVE.

Macropygia ruficeps (Temm.): *Salvad. t.c.*, p. 360; *Sharpe, t.c.*, p. 75.

The little Malay Cuckoo Dove is really by no means an uncommon bird in the Federated Malay States, though its shy and retiring habits render it unfamiliar to most of the inhabitants, Europeans and natives alike. It does not as a rule affect high jungle but is found in thick bluker, especially around deserted native gardens, as, like its congeners both in India and Australia, it is very fond of chillies. It is also abundant in the neighbourhood of the various thermal springs in Perak and Selangor. It is difficult to flush, but when forced to take wing flies with extreme swiftness, though only for a short distance. The nesting habits are unknown.

Localities in the Peninsula.—Perak: Larut (*Wray, Butler*), Batang Padang (*Robinson*); Selangor: Semangko Pass (*Butler*), Dusun Tua (*Butler*), Klang (*Davison*); Pahang: Gunong Tahan (*Waterstradt*).

General Range.—Burma, Tenasserim, Malay Peninsula, Borneo, Java, Sumatra.

Malay Name.—Tekukor api.

16. *COLUMBA GRISEA*—THE GREY PIGEON.

Columba grisea, G. R. Gr.; *Salvad. t.c.*, p. 248; *Sharpe, t.c.*, p. 68.

This species is one of the very rarest of all Pigeons and but very few localities for it are as yet known. None have been actually obtained in the Malay Peninsula, but I believe I have seen it in the Batang Padang mountains and on Pulau Jarak. Mr. Boden Kloss obtained a specimen on Pulau Taya, a small island of the Linga group, and it is elsewhere known from Borneo (Pontianak), from the islands of the Sarawak coast, where it has been obtained in large numbers, and from Sumatra.

17. *COLUMBA PUNICEA*—THE PURPLE WOOD-PIGEON.

Columba punicea (Tick); *Salvad. t.c.*, p. 306; *Sharpe, t.c.*, p. 71.

The only specimens of this species as yet obtained within our limits are from the neighbourhood of Selanga (Junk Ceylon), and it is doubtful if it extends much further south, except perhaps along the higher hills.

General Range.—Central India to Assam, Tenasserim and the Northern Malay Peninsula and also Ceylon.

18. *CHALCOPHAPS INDICA*—THE BRONZE-WINGED DOVE.

Chalcophaps indica (Linn.): *Salvad. t.c.*, p. 514; *Sharpe, t.c.*, p. 84.

The Bronze-winged Ground Dove is found throughout the Peninsula in suitable localities and is equally abundant on east and west coasts. It frequents, as a rule, damp localities and gullies in old and fairly open jungle, but is occasionally found in second growth forest, and I have even seen it in the Kuala Lumpur Public Gardens. Almost exclusively a ground bird, it runs with considerable swiftness, and but rarely makes use of its wings, though its flight is powerful for a short distance. It is seldom shot, but is snared by Malays in large numbers by the use of a decoy bird and a bamboo call known as *dekok punai*.

General Range.—The forest tracts of India and Ceylon; throughout Indo-China, the Malay Peninsula and Archipelago, as far east as the Philippines and the west of New Guinea.

Malay Name.—Punai tana.

19. *GEOPELIA STRIATA*—THE BARRED GROUND-DOVE.

Geopelia striata (Linn.) *Salvad. t.c.*, p. 458; *Sharpe, t.c.*, p. 80.

The Barred Ground Dove is generally distributed throughout the Peninsula but is never found in high forest and but rarely in bluker. It is perhaps commoner on the east than on the west coast and in the coastal districts rather than the more inland ones. It is usually very common in coffee cultivation, where it is found singly or in pairs, searching the ground for seeds, etc. It is a favourite cage bird among the Malays and high prices are paid for "lucky" birds, luck or the reverse being diagnosed by counting the number of scales on the toes.

General Range.—From Southern Tenasserim and Siam, throughout the Malay Peninsula and Archipelago as far as Celebes, Amboina and the Philippines.

Malay Name.—Merbok; ketitir.

20. *TURTUR HUMILIS*—THE RED TURTLE-DOVE.

Turtur humilis (Temm.); *Salvad. t.c.*, p. 434; *Sharpe, t.c.*, p. 79.

The Red Turtle Dove is an extremely rare bird in the Malay Peninsula and, so far as I am aware, only three specimens are definitely recorded from within our limits, being one obtained by Wallace in Malacca and two by Dr. Maingay in the same locality. All three are now in the British Museum collection.

General Range.—From Eastern Bengal through Burma and Tenasserim to the Andamans, Malay Peninsula, Indo-China, Formosa, Philippines, China and Japan.

21. *TURTUR TIGRINUS*—THE MALAY SPOTTED DOVE.

Turtur tigrinus (Temm. and Knip); *Salvad. t.c.*, p. 449; *Sharpe, t.c.*, p. 80.

This bird is found in much the same situations as the Barred Ground Dove but is less tied to cultivation than that species. It is widely distributed throughout the Peninsula and is particularly abundant in the sandy wastes and casuarinas that fringe large portions of the east coast. It is also very common in Negri Sembilan, especially in the Linggi district, but is rarer in Selangor and Perak. In habits it is less terrestrial than *Geopelia striata* and is much shyer. It is also more gregarious and at certain time of the year is found in flocks that may number as many as thirty or forty individuals, though this is exceptional. It is a common cage bird with all classes of natives.

General Range.—From Burma, throughout the Malay Peninsula and Archipelago as far east as Timor and the Moluccas.

Malay Name.—Tekukor.

Selangor State Museum, HERBERT C. ROBINSON.
Kuala Lumpur, *17th March*.

ON A FLYING-SQUIRREL (*PTEROMYS*) FROM PERAK.

THE following is a description of a Flying Squirrel, shot at the Tea Gardens on the Larut Hills last January.

General Appearance. Some 10 or 12 inches shorter than *Pteromys petaurista* (Large Malay Flying-Squirrel); muzzle sharper; the fur profusely variegated with pure white flakes, the ground colour being red with a dusky shade giving a slightly dark grizzled appearance; the tail rounded and black. Sex male; adult.

Dimensions:—

Total length—head, body and tail to end of vertebræ—$28\frac{1}{2}$ inches (say 724 mm.)

„ to end of hair, $30\frac{1}{2}$ inches (774 mm.)

Length of tail—$14\frac{1}{2}$ inches (368 mm.)

„ ear—$1\frac{1}{4}$ inches (30 mm.)

„ fore-paw—$1\frac{3}{4}$ inches (45 mm.)

„ hind-foot—$2\frac{1}{8}$ inches (51 mm.)

Stretch of parachute—17 inches (432 mm.)

Length of supporting cartilage—$3\frac{1}{4}$ inches (83 mm.)

The head is broad at the back and narrows rather suddenly at the muzzle. The fingers of the fore-paws are long, with fairly large claws. There are four digital pads, three meta-carpal pads and two carpal pads, large and small, respectively. The hind feet in comparison

with those of *petaurista* are small and have 11 pads each, distributed as follows:—five digital, five meta-tarsal, and one tarsal large, elongated and on the side. The tail, it will be noticed, forms exactly half the total length of the animal.

Colour.—Above blackish rufous with white patches which are most numerous on the fore part of the back. Underneath the fur is pale rufous with a pinky tinge including the under parts of the parachute which are dark chestnut on the upper surface, interrupted by only a few white flakes. The head is light chestnut slightly flaked. The tail ashy rufous at the root with a few dashes of white and the last two-thirds dead black.

A closer examination of the colouring brings out the following points:—Nostrils naked and flesh-coloured with a chocolate basal ring. Lips greyish white; chin black, forming a large spot. Moustaches black, eyelids black. Ears naked, with hairs (red) at the base only. Fore-paws with short deep chestnut hairs on back, black fingers and lead coloured palms. Hind-feet with rufous hair on back margined with black, and palms as in fore-paws. The parachute is margined with darker red all round. A single hair from the back shows a bluey-grey basal portion of fine texture graduating into a coarser texture of black which is ringed with red, the tip being black. The hairs constituting the white flakes are pure white throughout.

The Skull has the following measurements:—

Extreme length	...	...	$2\frac{1}{2}$	inches	(64 mm.)
Basal ,,	...	...	$2\frac{1}{8}$	,,	(55 mm.)
Zygomatic breadth	...	...	$1\frac{11}{16}$	,,	(43 mm.)
Occipital ,,	...	...	$1\frac{3}{8}$	,,	(35 mm.)

Dentition:—i. $\frac{2}{2}$; pm. $\frac{2}{1}$; m $\frac{3}{3}$.

The first pre-molar is deciduous and very small, but larger than that of *petaurista* in the two skulls compared.

A comparison of the anatomy of the skull with an adult one of *P. petaurista* shows a few possibly significant differences. The nasal bones are narrower—*i.e.*, not spread so much—and the pre-maxillæ have a pinched appearance, showing up distinctly the long alveoli of the incisors to their full length. The whole of the fore part of the skull, in fact, is proportionately narrower than that of *petaurista*, but the dorsal portion of the fronto-parietal suture is exactly the same width in both skulls—$\frac{5}{8}$ inch, or say 17 mm. The inter-orbital depression, present on the dorsal surface of the frontal, is not so deep as in *petaurista*. Posteriorly the skull is more rounded, the parallel ridges conspicuous in the parietals of *petaurista* not being so prominent. The post-orbital process is long and slender and leaves a space of $\frac{1}{4}$in. (say $6\frac{1}{2}$ mm.) to complete the circle with the zygomatic arch, the upward process of which is also distinctly larger than that of *petaurista*. Basally there is very little difference apart from that due to size.

Having carefully weighed up all these details, there stand out two facts pre-eminently important. Firstly that the new squirrel is not a variety of *P. petaurista*, and secondly that the record of its occurrence is new to Perak and, indeed, to the Federated Malay States. Whether

skins are to hand from other parts to which it can be referred I am not yet in a position to say. That just described, however, is being sent to Mr. Oldfield Thomas for identification, and we can but await his verdict.

Cantor, in a footnote to *Pteromys nitidus* (= *P. petaurista*, *Pallas*) says:—"In an individual from Malacca the back was very dark Indian red with a few dashes of pure white. The identity of the specimen is, however, doubtful." I take it that this specimen is likewise the one mentioned by Blanford as the original type of *Pteromys punctatus* ("Fauna of Brit. India"—Mammalia, p. 366). His description of the species is, however, brief; but it may be of interest to quote it here as I am inclined to think that the present animal if not actually determined as *punctatus* will come remarkably near it.

"Ears almost naked except towards the base.

"Colour.—Upper parts rich yellowish brown, darker on the head, more rufous on the parachute and limbs; back and crown with small irregular white spots, composed of hairs that are white throughout, basal portion of all other hairs on upper parts dusky. Lower parts and sides of head pale rufous, deeper towards the edge of the parachute. Tail light rufous brown throughout.

"Dimensions. . . . head and body (in a dried skin) about 14 or 15 inches. Basal length of skull about 2 inches, zygomatic breadth 1.7 inch."

From this description two marked variations in the coloration from that of the Perak specimen can be drawn: the yellowish brown of the back and the light rufous brown of the tail. But taking into consideration the remarkable instances of individual variations in many of the species of the Sciuridæ it is doubtful if these differences can be counted on as specific. However, both Cantor's and Blandford's mention of the white markings hardly apply to the skin under discussion, they being neither "few" nor could they with any degree of precision be designated "small white spots." On the neck, shoulders and fore part of the back they are so large and dashy, in fact, as to present a tendency towards streakiness.

Bandford's *punctatus* was obtained from Karennee at an altitude of about 4,000 feet. The Tea Gardens on the Larut Hills are situated at just on 2,000 feet above mean sea level; and, another detail, which is perhaps worth adding, is that the individual forming the subject of this note was shot, and others have since been seen in company with, *P. petaurista*. Mr. Boomgardt, of Taiping, who is responsible for the animal, told me that he had shot a similar squirrel at Alwaye in Travancore about ten years ago: but I do not consider the information sufficiently reliable to attach much significance to.

Perak State Museum, FRED. W. KNOCKER.
Taiping, *1st March, 1905.*

A RARE SQUIRREL FROM KUALA LUMPUR.

RHINOSCIURUS LATICAUDATUS—THE LONG-NOSED SQUIRREL.

AMONG some mammals recently collected on Weld's Hill, within a quarter of a mile of the Selangor Museum, was one specimen for which I was, for some time, at a loss to find a name. On investigation, however, it proves to be the above-named species, about which considerable obscurity exists, owing to its rarity and retiring habits.

First discovered in Southern Borneo and described by the Dutch naturalists Müller and Schlegel, in the first half of the last century, it was subsequently found in the Malay Peninsula by Dr. Cantor, who mentions having obtained five specimens, though he omits to state the locality, which was probably either Province Wellesley or Malacca. Other records from the Peninsula are few and far between; a specimen obtained by G. Moxon in 1851 is in the Calcutta Museum, one collected by Davison at Klang in 1879 was presented by Mr. Hume to the British Museum, and a third is recorded from Khota Glanggi, in Pahang, and is now preserved in the Raffles Museum, Singapore. The present individual completes the list of recorded specimens, the ones mentioned by Mr. Stanley Flower (*P.Z.S.* 1900, *p.* 359) as in this Museum being merely the pale form of *Ratufa bicolor*.

The species can be readily distinguished from all others inhabiting the Peninsula, except *Funambulus insignis*, by its short tail, which is less than two thirds the length of the head and body. The last mentioned squirrel, however, can be separated at a glance by its very much less elongated muzzle and by possessing a dark vertebral and two lateral stripes, which are completely absent in *Rhinosciurus laticaudatus*, which, in addition, has a much bushier tail. In habits both species are very similar, being ground forms, rarely found on trees but the long-nosed squirrel appears to be more nocturnal in its habits, which accounts for its comparative rarity.

SELANGOR STATE MUSEUM, H. C. ROBINSON.
KUALA LUMPUR, *17th March, 1905.*

A SAKAI COUNTING-STICK OR TALLY.*

THE object forming the subject of this note was secured some two years ago from the Sakais of Sungei Ujong—*i.e.*, from a member of the wild tribes inhabiting the hills in the north-west corner of Negri Sembilan, which form the boundary there between that State and Selangor, and are known as the Balau Hills. It is a four-sided, carefully cut stick, though considerably out of the straight, two feet long; and on one side is a series of sixty notches, and on the opposite side a series of nine. But to explain the meaning of these it is necessary to go into a brief history of the origin of the stick.

* Tallies were used in England by the Exchequer as late as the year 1782, and in the reign of William IV. the old tallies were ordered to be destroyed. The burning of the Houses of Parliament in 1834 was caused by the stoves being over heated with these sticks. They were used privately much later. I can remember, when a boy, seeing a tally hanging up near the kitchen door for recording the milk—ED.

$\frac{1}{3}$ Natural size.

A SAKAI COUNTING-STICK OR TALLY.

The Sungei Ujong Sakai counts, as he speaks, in Malay. He has, however, very little counting to do and probably had less before the establishment of a British protectorate over the country. Even now he has very little retentiveness for figures. Indeed it is never advisable to make any arrangements with him for more than two days ahead—not that he is hopelessly forgetful of an engagement, but simply that after the first day he quickly loses count.

When I was a Settlement Officer in the Seremban district it was one of my duties to count the fruit trees of the Sakai *dusuns*, which from time to time fell within the area of new mining concessions, for purposes of compensation to be paid through the Government to the owners, by the miner. On these journeys I always summoned two or three of the Sakais to accompany me, not merely for their own gratification but also to point out the trees and show me the way through the jungle, for in many cases the *dusuns* were right away from any path or beaten track. It was quite clear, however, that after the fourth or fifth tree the Sakais trusted implicitly in me to do the counting fair, they themselves not being able to remember from one number to the next, though the trees may have been quite close to one another. They were usually divided up in groups, however, which were often as much as a mile apart.

On one of these occasions I was unable to keep an appointment made the day previous by messenger, owing to a sudden attack of fever. When, afterwards, I was told that my absence did not make much difference, as the trees had been counted without my aid, I was not a little surprised. Knowing the people so well, it seemed to me a matter of utter impossibility. But my surprise soon changed to amusement and interest when the stick described above was produced and my interrogations deduced the fact that the series of sixty notches represented the number of durian trees and the series of nine represented the number of mangosteen trees which, as far as the enumerators could judge, would be included in the new concession. The Sakais had, in fact, gone round the *dusun* themselves on my non-appearance and at each tree they came to a gash was made in the bark to prevent counting it twice and its number recorded on the stick by a notch. More than that they could only tell me that they *thought* there were about nine mangosteen trees. But the durian trees were too many for them and they had left it to me to total up the notches. Yet when told there were 60 they apparently grasped what that number meant.

PERAK STATE MUSEUM, FRED. W. KNOCKER.
23rd March, 1905.

NOTE ON THE MALAY SAPI UTAN.

BY R. LYDEKKER, F.Z.S.

MUCH uncertainty seems to exist with regard to the wild cattle of the Malay Peninsula. It is commonly believed that representatives of two species, the banting (*Bos sondaicus*) and the gaur (*Bos gaur*) are to be met with in that area, the former being known as the

sapi utan and the latter as the sladang. As regards the sladang or Malay gaur, a young specimen was living in the Zoological Society's menagerie in 1890 and is figured by Mr. Blanford in the Society's *Proceedings* for that year. Although very young, this bull shows the characteristic forwardly inclined crest between the horns, and is in all respects an undoubted gaur. Of the Malay banting there appears to be no specimens in English collections, but the animal is reported to have the lower part of the legs reddish instead of white. This statement is based on the description by the late Mr. W. Davison in *Proc. Zool. Soc.*, 1889, p. 448, of a bull, apparently referable to *Bos sondaicus*, from the Malay Peninsula.

Recently I have received from Mr. H. C. Robinson, Curator of the Selangor State Museum, two skulls of reputed wild oxen from the Malay Peninsula for determination. One of these, which is characterised by the very small horns (some 6 inches in length) belonged to an animal shot by Capt. J. C. Lamprey, of the Malay States Guides, in Perak. It is figured in the *Journal of the Bombay Natural History Society*, vol. xiii, p. 192 (1900). The animal was lost when fired at (in the evening) but the carcase was found two days later partially devoured by a tiger. Capt. Lamprey described its colour as rich reddish chestnut with no white rump patch and with blackish "stockings" and muzzle.

When describing this specimen in the passage cited, Mr. A. L. Butler, then Curator of the Selangor Museum, expressed the opinion that it could not belong to any known race of banting and also quoted an extract from a work published in 1858 to the effect that the Malay sapi utan has no rump patch and very short horns, although it is not unlike in other respects the domesticated banting of Bali. A cow, stated to be 6 ft. 2 in. at the shoulder (!), is described as brown in colour with dirty white feet.

If, as I think probable, Capt. Lamprey's specimen is a female, both the above descriptions refer to cows. In the description of a bull by Davison, referred to above, the general colour is said to be blackish, with reddish stockings; the horns are stated to be large and no mention is made of a white rump patch.

Accordingly all the available evidence points to the conclusion that the Malay sapi utan has no white rump patch, and "stockings" in colour from dirty white to blackish or reddish, while the females have very small horns. In that the old bulls are dark coloured while the young and cows are rufous, it accords with the Javan and Bornean rather than with the tsine or Burmese race of the banting, in which both sexes are fawn coloured.

If the foregoing data are trustworthy (and I cannot go behind them) we seem to have decisive evidence that the sapi utan is a perfectly distinct form, although apparently a race of the banting rather than a distinct species. As a skull from Perak, figured and described by Mr. Butler in the *Journal of the Bombay Natural History Society* for 1900, has been presented by Mr. Robinson to the British Museum, I propose to regard it as the type of the Malay race, which may be designated *Bos sondaicus butleri*.

If I am right in these conclusions the most interesting feature about the Malay banting is the extremely small size of the horns of the

cows, for in this respect it appears to connect the typical banting with the extinct *Bos etruscus* of the Upper Tertiary deposits of the Val d'Arno in which the cows are hornless. *Bos etruscus* was long ago regarded by the late Professor Rutimeyer as nearly related to *Bos sondaicus* and the relationship now seems to be made still closer. In fact, if my data are trustworthy, the Malay sapi utan would seem to be the primitive type of banting, connecting those races in which the cows have long horns with *B. etruscus*. This, of course, is quite in harmony with the accepted view that the Malay fauna includes several survivors of ancient types.

A word in conclusion with regard to the second skull sent from Selangor by Mr. Robinson. As already mentioned, the horns are of a gaur-like type, and quite unlike those of the banting; so that I cannot regard this specimen as representing the male of the form to which the short-horned skull belongs. From the condition of the teeth it indicates a sub-adult animal. The skull, however, shows no trace of the strongly developed intercornual crest of typical gaur.

Were it not for the fact that the young Malay gaur referred to above (which was probably younger than the animal to which the skull belonged) is represented with a strong intercornual ridge, I should have been inclined to consider that the sladang lacked this ridge. If, however, the figure of the Zoo sladang be trustworthy, this hypothesis is untenable. To suggest that there are two kinds of Malay gaur is obviously unreasonable. Unless, then, the Selangor skull indicates a gaur shading off towards the gayal (which Mr. Stuart Baker, and I am inclined to think rightly, regards as a domesticated derivation from the gaur) I am unable to come to any definite conclusion with regard to its real affinity.

[*Reprinted from the "Field," February, 1905.*]

RHINOCEROS TRAPPING.

IN and near the Dindings, the catching and exporting of rhinoceros has been, in the past, quite a regular trade. It is said by the local Malays that some fifty of these animals have been caught there altogether; and that formerly they were very plentiful, but have now become scarce and difficult to trap.

They are caught in pit-falls, made in the jungle tracks which they follow. The pits are rectangular holes 7 hasters long, 3 hasters wide and 5 hasters deep—*i.e.*, $10\frac{1}{2}$ feet by $4\frac{1}{2}$ feet by $8\frac{1}{2}$ feet. These pits are dug out with perpendicular sides, then the sides and ends are lined with stakes of about 4 inches in diameter, driven into the bottom of the pit and of such a length that the upper ends are flush with the surface of the ground. At about one foot from the top are placed four horizontal pieces of wood, to hold the upright stakes in place. These horizontals are longer than the length and breadth of the pit and their ends are buried in the earth.

The heap or heaps of earth thrown out from the hole are carefully covered up with leaves. These heaps are thrown up on one side or on either side of the pit as may be most convenient, the length of the pit being in a line with the direction of the track which the animals are in the habit of following. The pit is covered with thin sticks, and leaves are laid on top of them. It is so well concealed that no one would notice a pit when walking through the jungle and they are most decidedly dangerous.

An animal having fallen into one, he is kept there by laying pieces of wood over the hole; these are laid lengthwise and the ends are retained by two cross pieces, which are themselves secured by eight stakes driven into the ground in a slanting direction, forming four Xs. These are lashed together with rattans where they cross and two other pieces of wood are laid on top of the crossings and also fastened down tight with rattan.

An enclosure is next built at the end of the pit where the animal's head is. It is made of wooden stakes securely lashed together with rattans and rather larger than the pit-fall. A fence on either side connects it with the pit and extends about a third of the length of the pit, so as to prevent the rhinoceros escaping sideways. There is a space left at the end of the enclosure next to the pit for the insertion of pieces of wood so as to close the open end.

All being ready, the longitudinal pieces of wood covering the mouth of the pit are withdrawn and earth is thrown into the hole at the end where the animal's head is, and he mounts on it and walks into the enclosure. Another method is to throw in pieces of wood on which he also mounts. Ropes often have to be employed to help him out. Having got him into the enclosure, the bars before mentioned are slipped into place to prevent him backing into the pit again.

A cleared track has now to be cut through the jungle from the pit-fall to the nearest river. This done, ropes are passed round the body of the rhinoceros, one just behind the shoulders and another in front of the hind legs. To each of these ropes are attached two others, two on either side of the animal. This being done, five men take hold of each of the ropes, that is, twenty men in all, while others demolish the enclosure. The rhinoceros is then made to walk along the previously cleared track to the nearest river. At night an enclosure is constructed round the animal and the men sleep in shelters close to it. It is said that they can take one a distance of ten miles in three days.

Arrived at the river, a cage is constructed of round wood poles and the animal put into it. The cage is then put on to a raft or boat. A place being chosen where a large tree can be used as a derrick to lift the cage. It can then be conveyed to a port and shipped to Penang or Singapore for sale.

The species inhabiting this district is the two-horned Sumatran rhinoceros (*Rhinoceros sumatrensis*). These notes were made in 1901, when an attempt was made to procure a specimen of *Rhinoceros sondaicus* for the British Museum. It, however, was discovered that this species did not occur near the Dindings. Three animals were caught, and as the Perak Museum was in want of a specimen, one of

them, a fine male, was taken for that Institution: another died, apparently from an old wound, and the third was shipped to Singapore.

It may be of interest to give here a brief account of how such a large, thick-skinned specimen was successfully treated in a climate which is so detrimental to this class of work. It was caught as previously described, and got out of the pit into an enclosure. It was then shot and skinned in the jungle. As it was computed to weigh about two tons, this was something of an undertaking. A medium sized tree was felled and made to fall across two other trees. These were then lashed together and used as shears, and with the aid of a pair of two-ton differential pulleys and two smaller pairs of blocks, the body was slung up and handled with ease. The animal was killed by a shot in the neck from a Police carbine, at about 8 a.m., and by the evening the skinning was completed. Some Chinese woodcutters begged for the flesh, and removed practically the whole of it. They also took other parts of the body for medicinal purposes.

The skin having been removed, it and the bones were dressed with 5 gallons of common salt, and one 2 lb tin of carbolic powder was used to keep off the flies. It was then done up in a bundle and left for the night. The next morning it was opened out and the salt well rubbed in, and then it was tied up in some old sacking, slung on a pole and carried some eight miles to the landing place, and then by boat to Sitiawan, which we reached that evening, after having spent two nights in an atap shed built in the jungle near the pit-fall.

On arrival at Sitiawan, the skin was put into a large tub with 3 gallons of water containing 2 lbs. of alum, 2 gallons of salt and 1 lb of dry alum. Three days afterwards it was put into a new solution composed of 2 gallons of water, 2 gallons of salt and 6 ounces of carbolic acid. It arrived in Taiping five days later rolled up in a bundle in sacking, and was put into a new solution of the same composition as the last. The skin was kept in this solution until it had all been thinned down and was ready for mounting, when the salt was washed out of it, by soaking for some days in constantly changed water. It was then poisoned and placed on the mannikin, which had been prepared to receive it. It may be added that the skin did not "slip" anywhere and at no time had any offensive odour. When first taken off it was fully 1½ inches in thickness, in places.

L. WRAY.

ON A SQUIRREL NEW TO THE FAUNA OF THE MALAY PENINSULA.

SCIURUS RUFIGENIS, *BLANFORD.*

Sciurus rufigenis, *Blanford, J. A. S. B.* xlvii, pt. 2, p. 156, pls. vii, viii (1878); *Thomas, P. Z. S.* 1886, p. 71, *Blanford, Faun. Brit. Ind. Mamm.* p. 376 (1891); *Bonhote, P. Z. S.* 1900, p. 194.

A SMALL but extremely valuable collection has recently been made by the Museum staff on the Selangor mountains in the neighbourhood of Ulu Gombak at elevations of between 4,000 and 5,500 feet. The series of birds includes a species of Peacock Pheasant

(*Chalcurus inopinatus*, Rothsch.) only described a month or two previously in England from specimens obtained in Pahang by Mr. Rothschild's collector; a Bamboo Partridge, also new, but which was obtained last year in the Telôm valley; a Whistling Thrush, previously only known from the mountains of Sumatra; and a variety of Green Pigeon (*Sphenocecus korthalsi*, antea p. 51) which has been doubtfully included in the list of Peninsula species but of which no specimen has hitherto been obtained.

Three species of mammals were obtained: *Tupaia ferruginea*, *Sciurus erythraeus*, and the individual under discussion, which I have no hesitation in referring to *S. rufigenis*, though it is possible that when larger series are available for comparison it may prove to be subspecifically distinct from the typical form. The following is a general description:

Pelage soft, with a thick greyish wooly under fur on the back. Colour of the upper surface grizzled dull yellow and black. Sides of the head, up to and below the eyes, rufous. Upper surface of the tail black, the hairs long and tipped with white, the terminal sixth similar to the back in colour. Chin and muzzle pale buff, breast whitish, tinged with buff, remainder of under surface greyish white. Ventral aspect of the tail and anal region, also inner aspect of thighs, rich chestnut. A large white spot behind the ears.

DIMENSIONS.—Head and body, 214; tail, 144; hind foot, 39; ear, 21 mm.

LOCALITY.—Gunong Mengkuang Lebir, Selangor, 5,000 feet. April 2nd, 1905.

GENERAL DISTRIBUTION.—Mooleyit mountain in Tenasserim and Karenee in Burma, apparently confined to high elevations. Also at Chingmai, Northern Siam. An allied form (*S. pernyi*) occurs in China.

REMARKS.—This squirrel can be readily separated from all others at present known to inhabit the Malay Peninsula by the patch of silky white fur behind the ears, which are somewhat large for the size of the animal.

SELANGOR STATE MUSEUM, HERBERT C. ROBINSON.
KUALA LUMPUR, *25th April, 1905.*

NOTES ON PARA RUBBER SEED OIL.

LAST season some observations and experiments were made on these seeds, and it was found that, on an average, 1,000 husked and sun-dried kernels weighed 4 lbs. 8 ozs. avoirdupois. As the amount of oil present in the kernels, according to Professor Wyndham R. Dunstan, is 42.3 per cent., one thousand seeds should yield, at 40 per cent. 1 lb. 12$\frac{3}{4}$ ozs. of oil.

Using the same figures, 497,777 dried kernels would weigh one ton and yield 8 cwt. of oil, or taking the specific gravity of the oil at 0.9302, 96$\frac{1}{3}$ gallons.

So far, it is impossible to estimate the yield of seed, but judging from the trees in the Museum grounds, Taiping, it may certainly be expected to average over a thousand seed per tree. The fruiting of the trees is very irregular, some of them being much more prolific than others. There is one small-leaved variety which hardly ever fruits, but it appears to occur very rarely; which is fortunate, as it yields little rubber.

It was found that if the kernels were dried, pounded and at once put into a press the resulting oil was clear and of a pale yellow colour. If, on the other hand, the meal was kept a few days before pressing, the oil was darker in colour and cloudy. The longer the time which elapsed between the pounding of the kernels and the expressing of the oil the deeper its colour. The oil was also more difficult to express as it became more viscid and required greater pressure to expel it from the cake. Some of the latest expressed oil was quite thick and so cloudy as to be opaque. It would become temporarily transparent on heating, showing that it contained, floating in suspension, a fat with a higher melting point.

These experiments were carried out with a locally-devised press, formed with some planks and a couple of carpenters' bench screws. As it was impossible with this press to get sufficient presure to expel all the oil from the meal, no determination of the comparative yield of the fresh and old meal could be attempted, but there appeared to be a considerably larger yield from the former.

Professor W. Dunstan writes in a report on the seeds of *Hevea brasiliensis*, "It will be observed that the oil extracted from the meal (which was sent to England) was solid, whereas that obtained from the freshly-ground seed was a liquid. This difference is due to the large proportion (65.6 per cent.) of free fatty acids present in the former, whilst the latter contained only 5.4 per cent. of free acids. The cause of this difference in the two oils has been investigated and it has been found that after the seed has been crushed the oil gradually undergoes decomposition, owing to the action of a hydrolytic enzyme contained in the seed." The present experiments confirm this statement and moreover show that the decomposition of the oil sets in quite rapidly after the kernels are crushed, also that the colour of the oil changes from a pale yellow, little if any darker than olive oil, to a deep brown.

The difference in the commercial value of the two oils would probably be considerable; and it would appear that to obtain the best quality and largest yield of oil, the expression should be done locally and that as short a time as possible should elapse between the grinding of the kernels and the extraction of the oil in the press.

Three samples of the above-mentioned oils are on exhibition in the Perak Museum. One from freshly-crushed seeds, one from seeds crushed about a week, and one from seeds crushed about two weeks. The contrast between the pale yellow, brown and dark brown oils is very marked.

L. WRAY.

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NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

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ON A NEW SPECIES OF *MUS* FROM PULAU JARAK,

By J. LEWIS BONHOTE, M.A., F.L.S.

I HAVE recently received for identification from Mr. H. C. Robinson a single specimen of a small rat, collected on the island of Pulau Jarak, in the Straits of Malacca. It belongs apparently to an undescribed species, and I propose for it the name *Mus jarak*, sp. nov.

Size about that of a small *Mus rattus*. General colour above dark brown, grizzled with fulvous and becoming rather paler on the sides. Each hair is dark at the base with a fulvous subterminal portion and a dark tip; on the flanks the dark tips are entirely absent. Interspersed among the fur are some very soft spines and long dark bristles. The underparts are pure white, and the line of demarcation between the colour of the upper and underparts, although distinct, is not abrupt. The feet are dark and scantily clothed with dark brown hairs. The tail is unicolor, stout and rather shorter than the head and body, the whiskers are long and dark.

The skull is that of a typical *Mus*. The rostrum is of moderate length and fairly stout, the nasal bones are long and taper posteriorly. The supraorbital ridges are strong and well marked, and the parietal ridges can also be traced well back. The autorbital foramen is large and square in its upper portion, narrowing down to a mere slit below, the outer plate being thin and leaning slightly outwards. The auditory bullæ are small and lie well up in the skull, the base occipital and palate are broad and the incisive foramina long and tapering slightly at their anterior end. The zygomata do not extend laterally but have a downward tendency, the lowest point being at about two-thirds their length from the anterior root. The teeth are normal and call for no special comment.

Dimensions (of type in flesh).—Head and body 180 mm., tail 160 mm., hind-foot 32 mm., ear 20 mm.

Skull.—Greatest length 42 mm., basal length 35 mm., palatal length 19.5 mm., diastema 12 mm., length of incisive foramina 7.5 mm., length of nasals 16 mm., zygomatic breadth 19 mm., interorbital breadth 6.5 mm., greatest breadth of brain case 15 mm., length of molar series (alveoli) 7 mm.

Habitat.—Island of Pulau Jarak, Straits of Malacca.

Type.—B.M., 5, 8-12-1.—Adult male, collected by Mr. H. C. Robinson on the 20th December, 1904.

This specimen, which through the kindness of Mr. Robinson has been presented to the National Collection, belongs apparently to the *Mus muelleri* group (*see* Fasciculi Malayenses, Zoology, vol. i, pp. 32, 34, 37, 1903). It agrees with the other species of that group in its dark general colour and proportions, differing only in the larger ear and very much smaller size.

The shortness of the tail and the small size of the auditory bullæ form characters which enable it to be easily identified; the latter in particular forming a marked feature by which it may be distinguished from *Mus annandalei* (loc. cit. supra, p. 30), which in colour and size it somewhat closely resembles.

July, 1905.

REPORT ON MINYAK SURIN.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, COLONIES AND INDIA.

Imperial Institute Road, London, S.W.,
13th July, 1905.

Sir,—I have the honour to forward a report on "Minyak Surin," the vegetable fat obtained from the seeds of the Surin tree.

The sample of this product now reported upon was sent to the Imperial Institute by Mr. Leonard Wray, Director of Museums, Taiping, Perak, and I shall be glad if you will kindly cause a copy of the report to be sent for his information.

I have, etc.,
WYNDHAM R. DUNSTAN.

H.E. the High Commissioner, F.M.S., Singapore.

REPORT ON A SAMPLE OF "MINYAK SURIN" FROM THE FEDERATED MALAY STATES.

By Professor WYNDHAM R. DUNSTAN, m.a., f.r.s.,

Director, Imperial Institute, South Kensington, London, S.W.

THE Imperial Institute received recently an enquiry from a firm of soapmakers in this country asking for information as to the possibility of obtaining commercial supplies of the seeds of *Palaquium (Dichopsis) oblongifolium*, or the oil expressed from these seeds.

In dealing with this enquiry it was found that practically nothing was known about these materials in this country, and that the information available regarding them in English and foreign literature is apparently entirely derived from a statement made by Dr. Burck (Medeelingen uit S. Lands Plantentium, vol. iii, p. 40), that the seeds yield a hard, white fat known as "Njatoh" fat, chiefly composed of stearin and olein, and which would be suitable for the manufacture of stearin candles.

It was considered unlikely that this product would prove to be of commercial interest since it is well known that this species of Palaquium only occasionally furnishes seeds, and that consequently large supplies of the seed were not likely to be obtainable, but in view of Burck's statement as to the composition of the fat and the uses to which it could be applied it appeared to be worth while to obtain a sample of the material for examination. Application was therefore made to the Superintendent of the Botanic Gardens, Singapore, and to the Director of Museums at Perak, Federated Malay States, for samples of the seeds or the expressed oil, and for any information which might be available locally regarding either of these products.

In response to this request the Superintendent of the Botanic Gardens, Singapore, in a letter dated the 6th December, 1904, stated that the seeds of *Palaquium oblongifolium* were extremely rare; that on some occasions as much as a dollar for each seed had been offered without securing any supplies, and that although during the last few years small quantities of the seeds had become available in the Straits Settlements, it was improbable that any had been used for the extraction of fat.

Similarly the Director of Museums at Perak, in a letter dated the 16th December, 1904, said that he could hold out no hopes of being able to obtain either the fat or the seeds of *Palaquium oblongifolium* as seeding trees of this species are rare, but the fat known to the Malays as "Minyak Surin," obtained from the seeds of a tree allied to *Palaquium oblongifolium*, could be secured in small quantities, and that he would send a sample of this material for examination.

The following information was given regarding Minyak Surin:

"The Surin trees grow singly in the jungle, usually at wide intervals, so that the collection of the seed is a matter of difficulty. The Malays on finding a tree shedding its seed gather them up and, after husking and sun-drying them, express the fat by means of a wedge press called "Apit Surin." The fat does not come into the local market, but is used by the makers for cooking purposes. The fat could not be obtained in quantities, nor at a price which would make it available for either soap or candle-making."

The botanical name of the Surin tree was not supplied, and in a letter dated the 2nd March the Director of Museums was asked for further information as to the relationship of the Surin tree to *Palaquium oblongifolium*.

The sample of "Minyak Surin" received weighed about two pounds, and consisted of cylindrical pieces of solid fat, which contained much dirt and foreign matter. The fat had a peculiar odour but was not rancid.

CHEMICAL EXAMINATION.

A portion of the sample was sent to Dr. J. Lewkowitsch, who had offered to investigate this material, and he has been good enough to supply to the Imperial Institute the following observations with regard to it:

"The fat was very dirty and was filtered to remove insoluble impurities. The chemical examination gave the following results:

Saponification value	...	179.5 milligrams of potash required to saponify one gram of fat
Unsaponifiable matter	...	4.54 per cent.
Free fatty acids ...	...	43.2 „
Iodine value ...	...	42.31 „
Reichert-Wollny value	...	0.55 „

The mixed fatty acids were isolated from a portion of the fat and gave the following results:

Solidifying point of mixed fatty acids	59.1 per cent.
Mean molecular weight of fatty acids	284.9 ,,
Proportion of stearic acid (m.p. 67.8° C.) in total fatty acids	58.2 ,,

From the foregoing numbers the conclusion may reasonably be drawn that the fatty acids consist practically entirely of stearic and oleic acids, but a more thorough investigation would be necessary before this could be asserted definitely.

The extremely high proportion of stearic acid would render this fat a most useful raw material for the candle industry were it not for the presence of considerable amounts of unsaponifiable matter, which would be equally objectionable in soap manufacture.

The commercial value of the fat would probably be from £24 to £26 per ton.

It was pointed out in the letter accompanying this sample that owing to the spare distribution of the Surin trees in the Federated Malay States this material could not be of any commercial importance since no large supplies of the seeds could be obtained, but it is interesting to note that the fat is suitable for industrial use, and that it would probably sell at fairly high prices if it could be obtained in large quantities.

The observation that "Minyak Surin" consists of stearin and olein is also interesting as showing that its composition is similar to that ascribed by Burok to the fat obtained from the seeds of *Palaquium oblongifolium*, and in this connection it would be of some interest to know the botanical name of the "Surin" tree in order that its exact botanical relationship to *Palaquium oblongifolium* might be ascertained.

WYNDHAM R. DUNSTAN.

13th July, 1905.

A SYSTEM FOR THE REGISTRATION OF THE CONTENTS OF MUSEUMS.

By L. WRAY, I.S.O.,

Director of Museums, Federated Malay States.

A GREAT deal has been written on the subject of Museum Registration, and several papers on it have already appeared in the Journal of the Association, but it is such an important matter to all those who have anything to do with the administration of Museums that probably another paper on it may be considered admissible.

It became necessary to adopt some workable system of registration in the Perak State Museum. One method had been tried some time back. There were accession books, registers and catalogues for each of the different departments, and a general index, by which it was supposed that particular entries and specimens could be found. In practice, however, it was found to be quite unmanageable. A careful study of the methods now in use in other Museums was therefore made while the writer was on leave in England in 1902 and 1903. It is unnecessary to enter into the process of selection by which the system which was finally settled on was evolved, but it will probably suffice to describe it in detail. Naturally it is a modification of other systems, principally in the direction of simplification, by the elimination of unnecessary complications.

The system is worked entirely with cards, no books of any sort being used. Others have in part discarded them, and Mr. E. E. Lowe, of the Plymouth Museum, has even gone as far as using books in conjunction with loose sheets and card catalogues, but books do not appear to have been altogether dispensed with before.

The central idea is this: a duplicate series of cards form the "Register" and the "Catalogue," the cards of the register being filed in the order of the accession numbers of the specimens, and the cards of the catalogue in the order in which the specimens are arranged in the Museum.

Now to come to details. The card selected was a form printed by the Library Supply Company, measuring 3 ins. × 5 ins., and ruled as shown:—

Accession No.	Date when Received

Place in Museum

DESCRIPTION OF SPECIMEN.

....

....

....

....

....

WHERE PROCURED.

....

....

....

....

HOW OBTAINED.

PRESENTED BY..

BEQUEATHED BY...

PURCHASED FROM..

COLLECTED BY..

It is possible that a better allotment of space might be made, but the cards answer their purpose very well. When a specimen is received, two of these cards are filled in with the particulars concerning it, and the specimen is numbered by sticking on a ticket or

painting or writing a number on it. If it is to go into an exhibition or store case, the number of that case is written on the cards under the heading "Place in Museum." One card is then filed in the register, in the order of its accession number, and the other card is filed in the catalogue under the case number, in its proper place in relation to the arrangement of the specimens in that particular case. For this purpose each gallery has been given a letter, and each case has been numbered, the numbers running from one upwards in each room. A wall or portion of floor-space which is used for displaying exhibits is treated as a case, and given a number also. So if 17 F. is written on a card, it will mean, in the Perak Museum, case No. 17 in the comparative ethnology gallery.

One or more drawers of the catalogue cabinet are given to each gallery. The drawers, in this particular instance, hold 3,000 cards, and have two brass card-holders in front to take labels indicating the contents. The drawers are sub-divided by guide cards into sections representing the cases. This is perhaps best done by using third guides, the odd case numbers being written on the left-hand and the even numbers on the right-hand cards, while the centre guides are reserved for sub-dividing the contents of the cases. These sub-divisions may be orders, classes or genera, in the zoological or other natural history galleries, or any other divisions in which the collection is arranged in other galleries. Further sub-division is effected by the use of coloured cards, which are plain ruled or blank for this purpose. These same or different coloured cards are used for cross references. There is a limit to the use of guides, because when they are too close together they cannot be read when looking at a drawer of cards.

The accession numbers are used with a date, thus:—1,420-04 or 1,343-05, a fresh number being started each year. The actual date of receipt is written on the right-hand upper corner of the card. In the register guides at each hundred are used. There are also third guides, and the odd and even numbers are written on the left and right-hand cards respectively, a centre card being used to denote the year. This is only necessary when a change of year takes place. Let it be supposed that in 1904 the last card used was 1,235; then the last guide used would be 1,200-04, and the next guide would be 100-05. The centre guide, bearing 1905 on it, would then come between cards Nos. 1,235-04 and 1-05. It might save time to sub-divide the register further, say into fifties. In this case fourth guide cards would probably be best, as the hundreds would still come on either side and the fifties alternately in the central half, with a distance equal to the thickness of two hundred cards between each guide.

In the case of a specimen or group of specimens from one source, which have to be examined and classified, or mounted, or possibly even sent away for identification, salmon-coloured cards are used, and one card is filed in the register and the other in a drawer of the catalogue cabinet set apart for the laboratory. When the specimen is ready for exhibition, the salmon cards are destroyed and white ones filed in the ordinary way. If the salmon card is a group or lot card, then it will be necessary to use white cards for each of the specimens, and if the accession number was, say, 360-05, to give them decimal numbers, thus: $\frac{360}{1}$-05, $\frac{360}{2}$-05, etc. As each specimen of a group or lot is worked out, it can be given a decimal number and the salmon

card retained, until all the specimens in it are worked out and find permanent resting places either in the exhibition, study, or duplicate series. Except in these cases, lot or group numbers do not appear to have anything to recommend them, and as far as possible each specimen is given a number of its own.

In starting a new system of registration in a Museum, the old collection, as well as the current acquisitions, have to be included in it, and there is a slight difficulty in the treatment of the two classes. It was decided in our case to date them with the year of registration, adding the date of acquisition, when known, on the right-hand corner, and in the case of accessions to keep a list of the numbers for use in making up the report of the year's work. It might have been better to have used, say, buff cards for all the old stock and white for all the new; but this was not thought of at the time of ordering the cards, and being in such an out-of-the-way place, was impossible to do subsequently without a delay of probably six months or more.

Should a specimen be destroyed, and such things will happen, even in the best-regulated Museums, its card in the catalogue may either be torn up, or preferably transferred to a drawer set apart for the purpose. In either case a reference must be written on the card in the register. The history of lost specimens is often of use and well worth preserving. Should this department unfortunately get large, it must be sub-divided by guide cards also, so that particular cards can be found without undue loss of time.

Loan collections can be treated by setting aside a drawer of the catalogue cabinet for them. A record can here be kept of specimens lent or of specimens received on loan. In the latter case it is probably advisable to keep a small separate register of them, as it is not convenient to put them on the main register. For this purpose the cheaper qualities of cards are good enough, and a coloured one could be used with advantage.

In practice thin, best quality, white cards have been used for the ordinary entries; thick, best quality, white cards for the guides; salmon pink cards for the undetermined specimens; blue cards for special specimens, such as those which have been figured or described, or co-types; and buff cards on which to write classification and cross reference notes.

It will be apparent that by this system it is always possible to re-arrange a case or gallery, or to insert or remove specimens anywhere in the collection. A whole line is given to "Place in Museum" on the cards, so it is easy to scratch out a case-number and write in a new one, whenever a change is necessary. Any system which does not allow of the re-arrangement of the collections is defective. Unfortunately, whenever a worker in systematic natural history studies a subject he thinks it necessary to re-name and re-arrange almost every genus and species included in it. Until a stop is put to this pernicious habit of the systematists (by, say, imposing a fine of 10/- in the case of a species and 20/- in the case of a genus, the fines to go to a benevolent fund for the benefit of prematurely-decayed Museum officials) we must allow for a constant change of classification of nearly the whole of the contents of a Museum.

It is a fairly simple matter to find any particular card, or group of cards, for it can be traced, if the number of any one of the cards in the group is known, by hunting it up in the register and finding the gallery and case number; or if the place of the group in the scientific sequence adopted in the collection is known, or if the number of the case in which the group is situated is known, by looking it up in the catalogue.

The catalogue, when arranged with its guides, can be used by anyone, for there is no elaborate system or set of symbols to learn and remember before it can be understood. This elaboration is the great drawback to some of the ingenious systems which have been proposed. In my experience of Museum administration, time is always too short to do the work which should be done, and the useful innovations are those which save time and labour. In this connection, it may be added, that, as the entries on one set of cards are exact copies of those on the other set, any clerk capable of copying can do one half of the whole work of registration.

[*Reprinted from the "Museums Journal," June, 1905.*]

A SHORT ACCOUNT OF SOME "ANCIENT REMAINS" FOUND ON GUNONG JERAI, KEDAH.

(*WITH ONE PLAN.*)

By Mr. F. W. IRBY,

of the Perak Trigonometrical Survey, February, 1894.

GUNONG JERAI, more generally known as Kedah Peak, is a mountain of about 4,020 feet in height, and is about 24 miles to the N.N.-E. of Penang. It has a very abrupt and sharp appearance as seen from the south, but on the northern and western sides it is quite easy of ascent.

The top of Jerai itself is a quartz sandstone, with a dip of about 15° to the north-west, but cut off on the south by a precipice of about 140 feet in height with a strike N. 53° east. Below this precipice boulders and intrusive granite can be seen. The crest of Jerai is evidently the result of an upheaval, the centre of action of which was immediately below. The formation, being very friable, has been denuded on the southern slopes and now forms a scarp. The sandstone on the northern and western slopes is generally uniform in its bedding, though there are indications of contortion and local metamorphism. It dips beneath the alluvial soil at the foot of the range and passing under the sea comes up again in the Bunting islands.

On these slopes there are no granitic rocks so far as I was able to ascertain, but all are schistose rocks of sedimentary formation.

The usual way to approach Gunong Jerai from Penang is by steamer to Kuala Yen, a small rivulet that rises on its western slopes. The shore is so shallow that it is not possible to approach even with a

small launch, within half a mile, and even native canoes cannot be paddled into the stream at low water. Kuala Yen is a small kampong with padi fields which stretch back from the shore line to the foot hills, perhaps a mile or more. The headman is Raja Saman, a very intelligent Malay, who is always willing to assist travellers with coolies and accommodation.

The track from Kuala Yen is through some very old "dusuns" or orchards, and after about 2 miles strikes a spur, up which is a very fair track that no doubt has been in use for centuries, as it is so well defined. At 3,100 feet the path leads into a glen known as Padang Taseh where there is always water to be found. It is the best place to camp as the top of Jerai can be easily reached in an hour from it and no water can be got higher up.

On the 1st February, Mr. Irby's Malay coolies unwittingly set fire to the peat, which being very dry burnt rapidly and could not be extinguished. On the night of the 4th February it rained sufficiently to somewhat extinguish the fire, and on the following morning his Malays reported that they had discovered a row of bricks on the top of the crest where the peat had been mostly consumed. Mr. Irby had the débris cleared away and came upon the hearth. Over the hearth several stumps of large trees were found whose roots had worked their way through the stone and displaced them to a considerable extent.

In the centre was discovered a vault, or well, which no doubt was originally circular, with a diameter of about 2 feet 6 inches, and 2 feet deep. An irregular slab of sandstone was at the side, evidently used as a cover. Careful search was made, but nothing of any interest found except a few pieces of vitrified clay bricks very similar to the ordinary Chinese ones, and a little wood charcoal.

The hearth itself is shown in accompanying sketch at the point A on plan of site. It was about 16 feet square and consisted of two courses of granite slabs, or bricks, about 14 inches long, 7 inches wide and $2\frac{1}{4}$ inches thick. By far the greater number were in their original positions, and only displaced here and there by the roots of trees. At a later period I made an examination on the spot and measured six of the slabs taken at random, with the following results:

(1)	1′ 2″	× 7″	× $2\frac{1}{2}$″	...	14″	× 7″	× $2\frac{1}{2}$″
(2)	1′ 0″	× 7″	× 3″	...	12″	× 7″	× 3″
(3)	– 10″	× 6″	× $2\frac{3}{4}$″	...	10″	× 6″	× $2\frac{3}{4}$″
(4)	1′ 2″	× 8″	× 3″	...	14″	× 8″	× 3″
(5)	1′ 1″	× $7\frac{1}{2}$″	× $2\frac{3}{4}$″	...	13″	× $7\frac{1}{2}$″	× $2\frac{3}{4}$″
(6)	1′ $2\frac{1}{2}$″	× 7″	× $2\frac{1}{2}$″	...	$14\frac{1}{2}$″	× 7″	× $2\frac{1}{2}$″

The interior was covered by bricks roughly hewn from laterite.

Further exploration by Mr. Irby and myself led to the discovery of another hearth at the south-west corner with the hole outside the perimeter. It had been destroyed to such an extent that it was difficult to get its outlines at first, but a little careful excavation enabled me to make a fairly accurate measurement. The dimensions were about 15 feet by 12 feet. The site is shown in red on accompanying plan of the top of Jerai. Indications of no less than nine small hearths, about 4 feet square, were found between the two

largest. The foundation of what appears to have been a rubble wall was traced in a north-easterly direction for 160 or 170 feet, it was then lost beneath the peat which the fire had not consumed.

On the undercliff, on the south-eastern side, there were many pieces of clay bricks and granite slabs found, and from their positions they would, in my opinion, point to a landslip on that side subsequent to the building of the hearths and settlement of priests or others on the top of the hill. The rubble wall would also appear to have extended to the corner of the precipice which bears round to the north, and no doubt served as a fence.

The granite slabs are fairly uniform in size and well tooled, and would appear to have been cut from boulders, as in some instances curved ends have been left in the rough which are precisely similar to the surface of a granite boulder. Samples of the granite slabs, clay bricks and laterite blocks have been deposited in the Perak State Museum.

Mr. Irby made most careful enquiries of the Malays from the neighbouring kampongs who came in scores to see the discovery. They all said they knew nothing about any ancient settlement on Jerai and that their ancestors had not handed down traditions concerning it. Later on others said there must have been a Siamese crematory on Jerai, "as the bricks were unknown in their parts and must have come from over the sea," and the bodies were placed in the holes and burnt there. But some Siamese who came up said that it was the custom to burn their dead above ground.

The Malays further said that in sailing to Acheen, Gunong Jerai is visible until a high mountain in Sumatra comes in view, which fact might suggest that signal fires had been kept burning on Jerai in former days to guide mariners, sailing from Sumatra, at night.

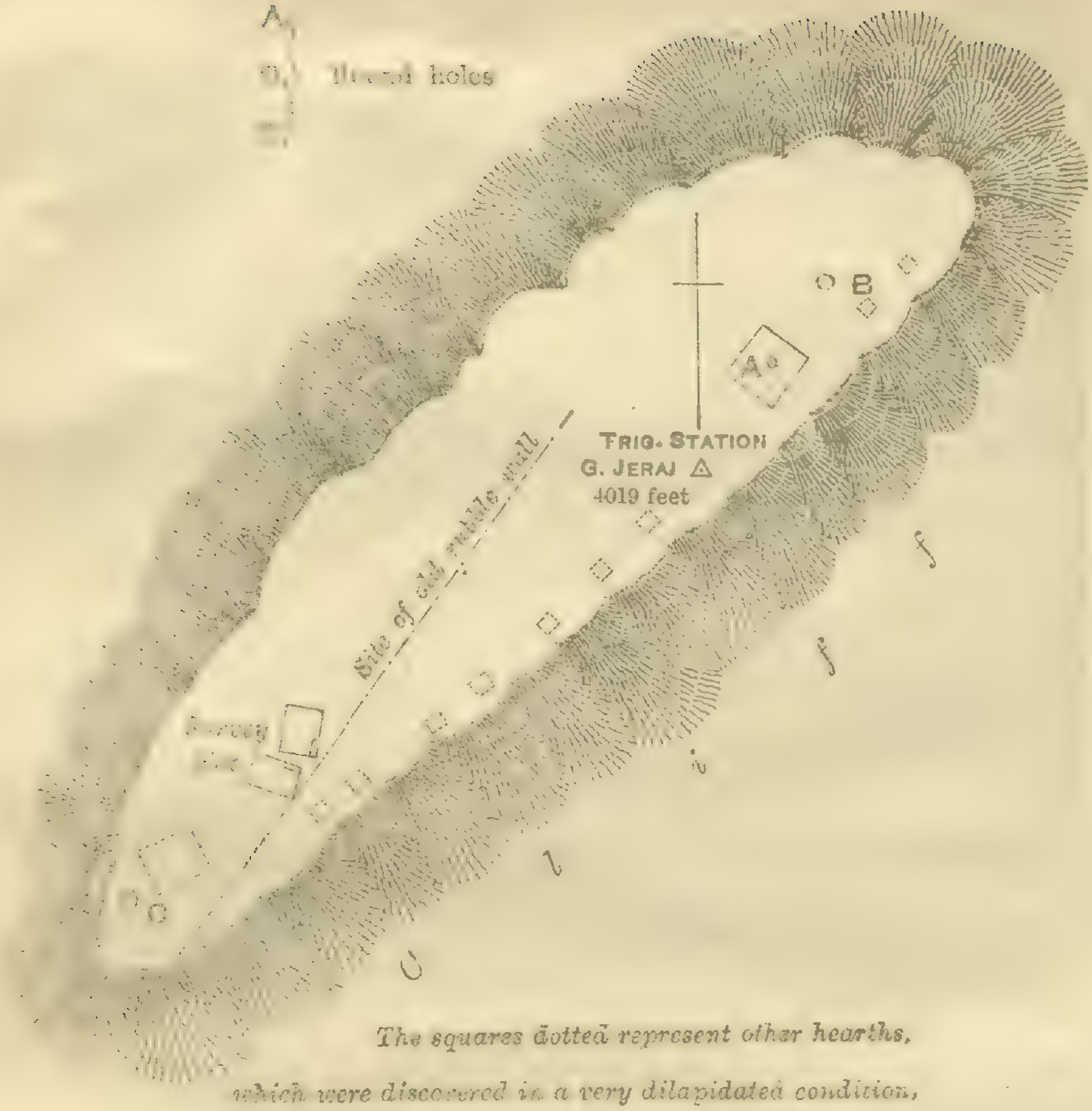
But it is improbable materials such as cut granite and bricks would have been carried 4,000 feet up a mountain side to form a base for a signal fire when there was any quantity of sandstone, much easier to work, ready to hand.

The Penghulu of Yen, Raja Saman, had a long story that Jerai had once been inhabited by "Gergasi," creatures of human form who devoured ordinary mortals, but that none had been known to exist for the last 200 years. His theory was that these creatures were responsible for the constructions found. Many other tales, equally improbable, were given.

There can be little doubt but that the builders must have been long antecedent to the Malays and that the latter know nothing about them.

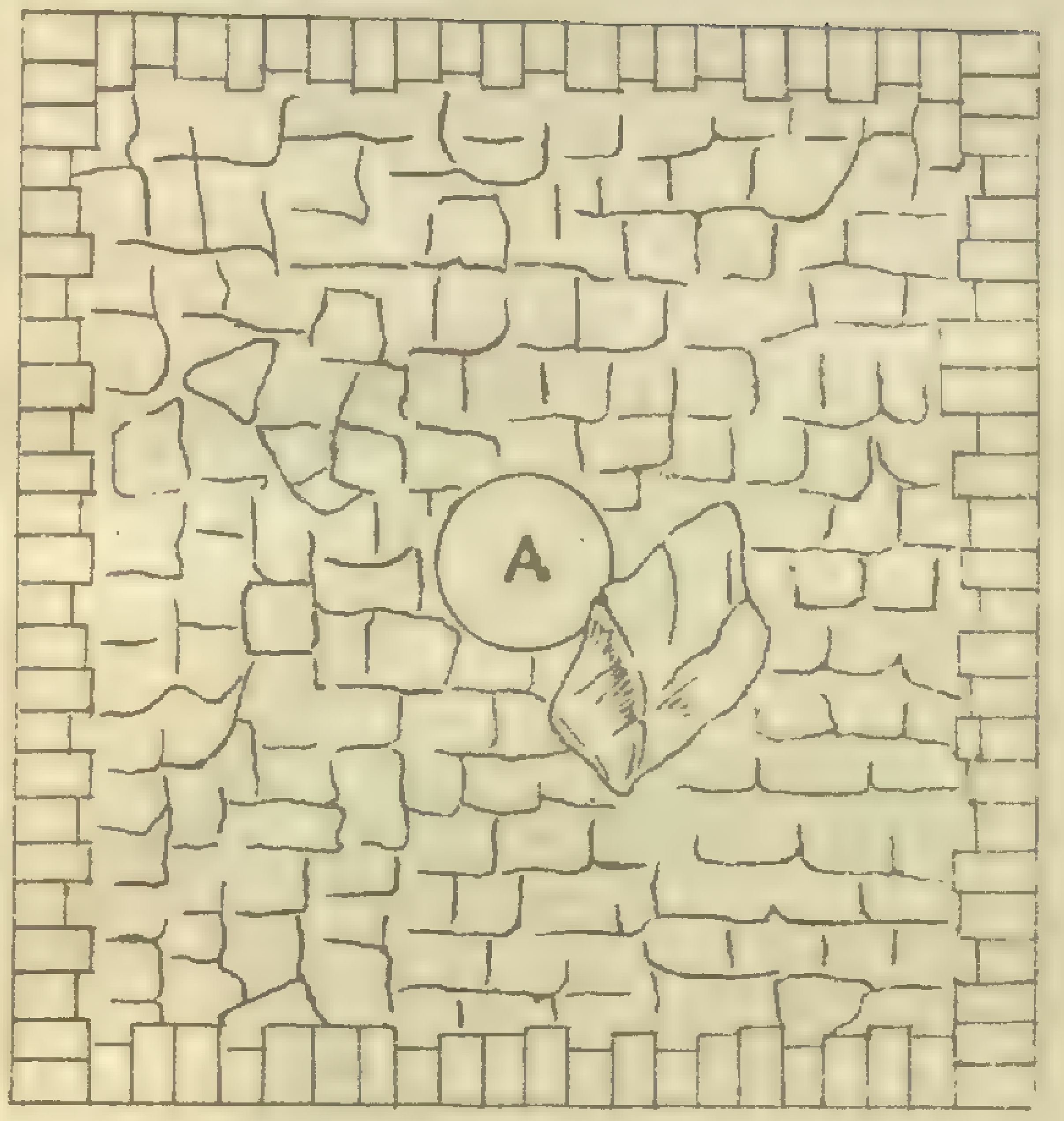
The depth of peat on Jerai before the fire must have taken centuries to form, as it rested on the sand-stone, which was almost devoid of soil, and when burnt the little ash formed was rapidly blown away by the wind. If a landslip occurred when the top of Jerai was inhabited, as appears to have happened, those not destroyed would probably have fled immediately with the belief that it was the result of some supernatural agency and not have returned.

Scale $\frac{1}{810}$



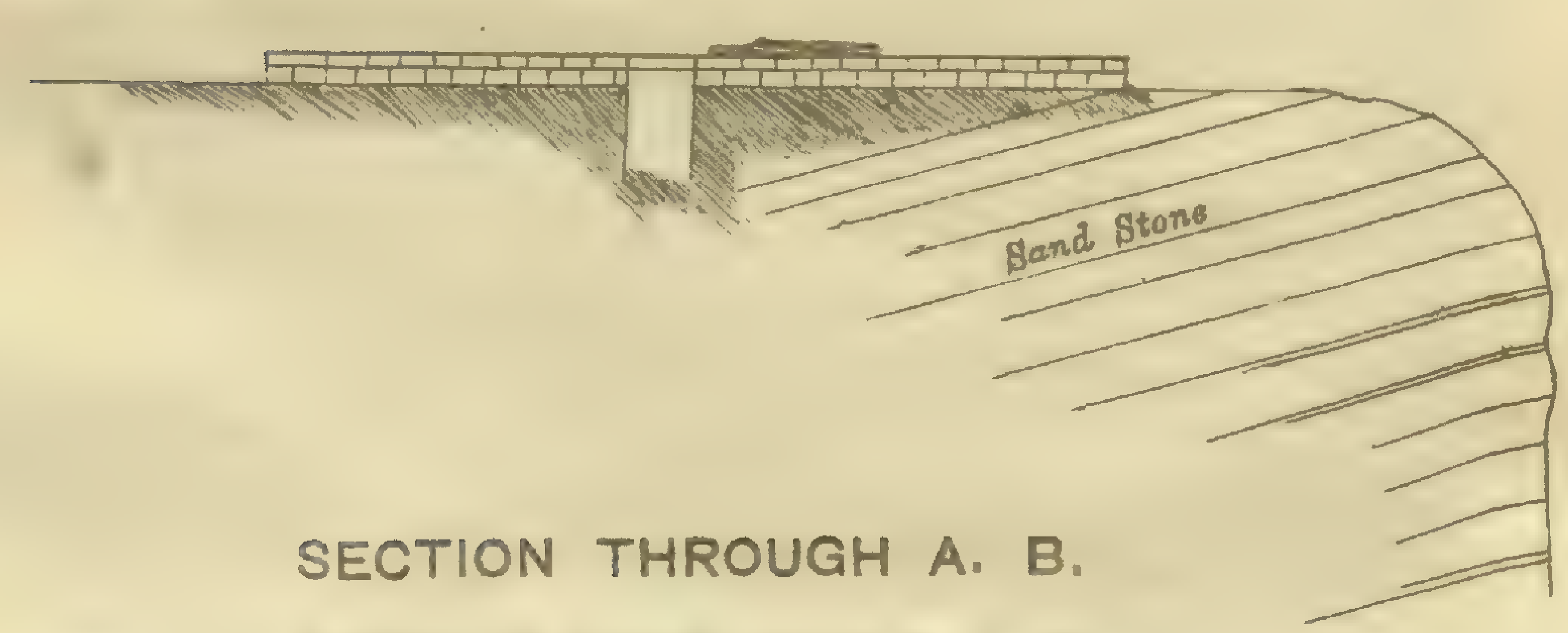
The squares dotted represent other hearths, which were discovered in a very dilapidated condition, and in some instances were barely distinguishable. Quantities of broken granite, and clay-bricks were found in the vicinity.

Scale $\frac{1}{81}$



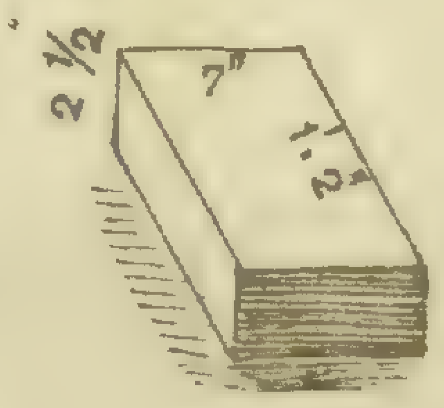
PLAN A.

Plan representing hearth, if perfectly restored.



SECTION THROUGH A. B.

Section of hearth through A. B.



Granite bricks tool dressed.

…OGRAPHED AT THE REVENUE SURVEY OFFICE TAIPING, PERAK.

Tradition would keep others from making the ascent for many generations perhaps, and thus the vegetation would have had an undisturbed opportunity to form soil for itself and cover the ruins so effectually that when some venturesome Malay did arrive at the summit all signs of any former settlement would be obscured.

If such a catastrophe as the landslip on Jerai had occurred since the Malay occupation some tradition would remain as to what existed on it previously, but none does. On the other hand, the Malays have a tradition that Jerai was once united to Gunong Perak, a large mountain to the north-east, to which it was married, and that subsequently it broke away and became the parent of Pulau Bunting, an island about 10 miles distant in a north-westerly direction.

This tradition may have been derived from some previous settlers with a knowledge of a great landslip on Jerai, and who with poetic license had made the most of it as a supernatural business, and omitted to lay any particular stress on the settlement which was destroyed by it. Perhaps some authority on the history of the Malay Peninsula may be able to throw light on the age of these remains, and if some further search is made and the peat remaining be carefully handled it is quite possible some utensils or implements may yet be found.

This account is accompanied by four photographs and a ground plan of the crest of Gunong Jerai which will explain themselves. For the Malay traditions I am indebted to Mr. Irby.

G. A. LEFROY,
Chief Surveyor, Perak.

TAIPING,
20th February, 1895.

THE RUINS ON GUNONG JERAI, KEDAH.

It was on the morning of 5th February that, overhearing some conversation between Penghulu Awang, of Yen, and the coolies, I went up to the highest point of Gunong Jerai, from the hut being erected close by, and found as Awang had said a row of bricks close to the eastern precipice of the peak. Over these the fire was still burning, a mass of smouldering leaves and débris from two to three, and where piled against the stumps of trees cut down by former visitors, perhaps four feet in depth.

I raked away as much of the smouldering mass as possible, still keeping the fire going, and before evening had the court fairly clear of débris: but there still remained the stumps of three trees, the largest one on the eastern and the other two, not much smaller, on the western side of the well, their roots going down into the well and others extending right across the court on either side.

These stumps, which had been cut, I should say, within a twelve month or so, were of the size and no doubt of the same age as the rest of the trees on the summit, and from the extent of the relics afterwards disclosed I believe that the whole top of the hill had been cleared at the time these were in use, and from these trees perhaps some idea of the date of abandoning the place may be obtained.

It was on the two or three days following that I noticed the many mounds and the vaults to the north, the fire still burning, the vault had another large tree stump growing over it, and this is now lying to one side, the ones over the court had to be removed to obtain clear sights for the trigonometrical work I was engaged on, and as this could not be delayed I had to extinguish the fires on the 8th, leaving a considerable patch of peat and dead leaves that may still be covering something of interest.

I had many native visitors during the time I remained on Jerai, but could get no information, their grandparents, so they said, having had no knowledge of it. Haji Maolim, the Guru of Yen, thought it was a place for the exercise of religious ceremonies, and that a subterranean passage might exist from the well in the court to some opening lower down the side of the mountain; but this is not so, as hard bottom was struck in clearing out the well.

Others thought it was a Siamese crematory, as the bricks were unknown in their part and must have come from over sea, but on two Siamese coming up I had questions put to them as to whether the custom was to place the corpse in a hole and cover it up whilst being consumed but this they said was not so, the body being *di atas tanah*; so this failed to explain the well.

I was told that in sailing for Acheen, as soon as Jerai was lost to sight, a mountain in Acheen came into view, and perhaps in olden times beacon fires may have been burned here, but these places would certainly not have been made for this purpose alone.

Another said he thought the top of the hill had been stockaded during some former war, and in such a case the wells may have been stores for treasure, food, supplies or perhaps even water, but who the people might have been or where they could have got the bricks remains a mystery; still I am inclined to think that this theory may be worth investigating, and if some idea of the age of the occupation can be obtained from the trees some interesting historical events may be revealed.

Raja Saman, of Yen, quite seriously said that it was the work of the Gergasi, which he explained were creatures having the appearance of mankind but still not of them, being also devourers of human beings, in fact the ogre of fairy tales, but of these none had been known to exist for the last 200 years. I have no doubt this is accepted by all the Malays as the true explanation, but others were afraid to tell me so for fear of being laughed at.

Other stories which I was told had reference to the mountain, but no connection with the ruins. One was that Gunong Jerai is a female and was once joined both in proximity and matrimony to Gunong Perak, a male, but for some reason I did not discover the latter hunted the former to its present position.

Another, in connection with the Padang Taseh, the lower camping place. This was given by a Raja Ibrahim to Haji Taseh as a hermitage and the holy man lived in seclusion there, afterwards it was taken up by Chinese for mining but they failed, then a Malay took another place, also for mining purposes, but kept his whereabouts and doings

secret. One day his camp was discovered by a Raja who noticed a tungku of gold on the fire, and Raja-like immediately appropriated it. For this he was struck by the owner, a Korinchi man, who then exercised his powers, turned into a tiger and patrolled Jerai for years after. What became of the Raja and the tungku I do not know.

With regard to the Korinchi I was told that there are two streams, very difficult to discover, which join, one being clear and one muddy. Water must be taken from both, the muddy on being applied to the body causes it to take the form of a tiger, while the clear restores it to its former state, the power being lost when the supply of water is exhausted.

FRED. W. IRBY.

TAIPING, *28th April, 1894.*

FOSSIL TOOTH OF *ELEPHAS NAMADICUS* FROM PERAK.

A PORTION of an elephant's tooth, which was found in Tan Ong Peng's mine, opposite the old Police Station at Salak, Kuala Kangsar, at a depth of 12 feet from the surface, and which was presented to the Perak State Museum by Mr. Tan Ong Peng per Mr. N. T. Gray, was recently sent to Dr. Charles W. Andrews, D.SC., of the Geological Department of the British Museum, for examination. In a letter dated 18th July he writes. "The tooth is a molar, probably upper of *Elephas namadicus*, Falconer and Cantley, a species found in the Nabada beds of India, and probably of Pleistocene age. This species has already been found in Burma and at Bukit Besar, Nawngchik."

Respecting the last-named specimen the following note by Dr. Andrews appears in Messrs. N. Annandale and H. C. Robinson's Fasciculi Malayenses, Zoology, Part II, page 307:

"The tooth on which Dr. Andrews has been kind enough to write the following note was found by a native on Bukit Besar, Nawngchik, and sold to us at Ban Sai Kau.

"This specimen seems to be of considerable interest on account of the locality in which it was found. It is an upper molar of *Elephas namadicus*, a species found in the Upper Siwalik beds, particularly in the Nabada valley. I have also received remains of this animal from Burma (near Mandalay) quite lately, but never from further south. Of course the Siwalik fauna is known to occur in Sumatra and Java, though I do not think that this particular species has been recorded from these islands. In any case, the occurrence of this tooth in the Peninsula helps to bridge over one of the gaps in the area over which the Siwalik fauna extended.

"The age of *E. namadicus* was probably late Pliocene or early Pleistocene."

The finding of this specimen in the State of Perak further extends the range of the species southwards, down the Malayan Peninsula. The depth at which the tooth was found would indicate that it came from the lower portion of the over-burden or the upper portion of the tin-bearing wash-dirt or *karang*. In this part of the valley the alluvium was very various in depth owing to the bed-rock, a hard bluish-grey slate, presenting an uneven surface. In some places the tin-bearing stratum was as much as 24 feet in thickness, while in others it was not more than 5 or 6 feet.

DESTRUCTION OF NOXIOUS ANIMALS.

[*Extract from the Report on the Federated Malay States Police Force for the year 1904.*]

RETURN Q is a return showing the number and description of noxious animals destroyed in the several States with the total money paid for their destruction. The following is an extract from section 20 of Mr. Sumner's report, describing how a woman lost her life through injuries inflicted by a panther:

"At or about 11 p.m. on 12th November, a Chinaman, living at Sempalit, Raub District, heard a noise at the fowl-house. He opened the door of the house, and while in the act of passing through, a black panther sprang through the door into the house and attacked a Chinese woman who was lying sleeping on a bed, biting her about the head and face. The husband pluckily ran to her assistance and was also attacked by the beast. He, however, succeeded in driving the panther off which ran under the bedstead. The man and woman ran out of the house and closed the door. A report was made at the Raub Police Station. The Lance-Corporal on duty immediately despatched two Malay police constables to the scene, armed with snider carbines and buckshot, with a view to kill the beast. On arriving at the house, P.-C. 219, Ali, opened the door, and by the glimmer of a Chinese lamp could see the panther lying down beneath the bedstead. The P.-C. fired two shots at it and then drew his kris and entered the house. On perceiving that the shots had taken effect, and being under the impression the panther was dead, he put his hand under the bedstead to drag the body out, but was suddenly attacked and wounded on the hand. He, however, quickly despatched the panther by stabbing it several times with his kris and finally causing the carcass to be conveyed to the Raub Station.

"The injured people were taken to the Raub Hospital by the Police, where their wounds were attended to, but the unfortunate woman succumbed to her injuries in spite of all the possible attention that had been shown to her."

I have heard of no other cases of deaths through wild beasts.

RETURN SHOWING THE DESTRUCTION OF NOXIOUS ANIMALS FOR WHICH REWARDS WERE PAID DURING 1904 IN THE F.M.S.

States.	Crocodiles.	Crocodiles' eggs.	Tigers.	Leopards.	Snakes.	Rewards.
						$ cts.
Perak	641	1,361	21	15	633	2,826 22
Selangor	476	343	7	11	310	1,576 61
Negri Sembilan ...	3	...	7	4	...	225 50
Pahang	10	28	10	3	46	315 70
Totals ...	1,130	1,732	45	33	989	4,944 03

H. L. TALBOT,
Commissioner of Police, F.M.S.

REPORT ON THE MUSEUMS DEPARTMENT, 1904.

THE Federal appointment of Director of Museums was made on the 17th March, 1904, and the holder of it was relieved of his duties as Curator and State Geologist, Perak, on the 9th of May, by the appointment of Mr. F. W. Knocker as Curator of the Perak Museum.

No staff was provided and, with the exception of salary, for which provision was made, money had to be taken from the Perak Museum votes to cover the travelling and other expenses of the head of the department.

PERAK STATE MUSEUM.

The casing of the new rooms was completed in the early part of the year, and on the 1st of February the work of moving the ethnological collections into them was begun. This necessitated shifting almost everything in the whole of the building, and although the new rooms were opened to the public at the latter end of the year, the process of rearrangement, both in them and in the rest of the Museum, will not be completed for a long time to come.

ETHNOLOGY.

It has been recognised that the chances of acquiring objects illustrating Malayan civilisation are rapidly passing away, owing to the altered condition of the country consequent on the introduction of Western ideas and manufactures. Therefore, as something approaching adequate accommodation was, for the first time in the history of the institution, available for the display of the ethnological collections,

special attention was paid to this branch of science and an endeavour was made to add as much as possible to the section. It is satisfactory to be able to state that the additions to it have undoubtedly been far greater than in any previous year.

Taxidermy.

Owing to the absence on long leave of Mr. Keilich, the Taxidermist, during the greater portion of the year, the taxidermic work was restricted to very narrow limits. Bad work in this line is probably worse than none particularly when it has to be exhibited side by side with better work.

Registering and Cataloguing.

This important subject was studied by the Director while on leave in England, the systems of several Museums examined and the literature on the subject consulted. On the recommendation of the Director of the Manchester Museum, the Library Supply Company was visited and catalogues and samples obtained from it. The Curators in Perak and Selangor were consulted, the former being familiar with the systems in use in the Leicester and Bristol Museums and the latter in the Liverpool Museum.

The apparatus necessary to carry out the system which had been evolved was ordered through the Crown Agents. The indent did not arrive till the latter end of the year and the work of registering was not begun till November, but from the way in which it worked and from subsequent experience of it, there appears to be no doubt that the plan is quite satisfactory.

In this new system all the numerous books which other plans involve have been abolished and the whole thing is done by the aid of a double series of cards, one filed in numerical order and the other in the order in which the specimens are arranged in the cases. The entries being on cards, the whole or any part of the collection and register can, when desired, be rearranged, and additions inserted in their proper places.

About 12,000 cards and a cabinet capable of accommodating 22,000 were procured by way of a commencement. The work of registration will probably take several years to accomplish, and there will then only be the current accessions to enter up as they come in.

SELANGOR STATE MUSEUM.

In the early part of the year the members of the Museum Committee were relieved of their duties and the institution came under the supervision of the Director. Five visits, totalling thirty-one days, were paid by him to Kuala Lumpur during the last nine months of 1904.

Owing to the ruinous state of the old building, it was decided not to attempt any improvement of either the cases or the contents of the Museum, but to collect and pack up in tin-lined packing-cases as many specimens as possible, so as to preserve them and have them ready for transport to the new building when it is completed. This necessitated closing one of the exhibition rooms, so as to use it as a store.

Considering the state of the building and the contents, the number of visitors admitted may be considered quite satisfactory. They totalled 34,470.

As the Curator has made a full report of the work done during the year and of the progress of the new building and cases it is unnecessary to go over the same ground again here.

GENERAL.

Collecting.

A collecting expedition was made in Pahang and a very extensive collection was the result. The greater portion of it was ethnological in character, but a good many ores, minerals and fossils were also obtained. This State was previously almost unrepresented in the Perak Museum. The bulk of the specimens were deposited in that institution, but a good many went to Selangor. The time occupied in traversing the State of Pahang was 45 days.

Other shorter collecting trips were made and the total time spent away from head-quarters was 131 days.

Imperial Institute.

Exhibits for the Straits and Native States Court at the Imperial Institute were collected, prepared and sent to London. Amongst these may be mentioned a series of botanical specimens of gutta percha and india-rubber producing plants, various minerals and ores from the gold, tin and other mines of the Native States, and a set of nine slabs of marble from the Ipoh Marble Works.

Samples of corundum and of *Minyak surin* were spent for examination in the laboratories of the institution, under the arrangement entered into between the Government of the Federated Malay States and Professor Wyndham Dunston, F.R.S. The corundum has been favourably reported on in the "Bulletin of the Imperial Institute" and a larger sample has been asked for, for further trials of its suitability for the movements of clocks and watches and as an abrasive agent.

Anthropological Photographs.

At the request of Sir W. H. Treacher, K.C.M.G., the then Resident-General, a series of twenty-eight photographs of Semangs and Sakais was taken to help to illustrate Mr. W. W. Skeat's forthcoming book on the "Wild Tribes of the Malay Peninsula."

Contributions to other Museums.

A small collection of ethnological specimens, comprising about forty articles, was made and despatched to the British Museum, Bloomsbury. The Malay Peninsula is practically unrepresented in the National Collection. With very few exceptions, there are only the specimens which have been sent from the Perak Museum in former years in it.

July, 1905.

Some Malayan tin coins were sent to the Bankfield Museum, Halifax.

Pests.

An attempt was made to exterminate the rats on the Rubana and Nova Scotia Estates in Lower Perak by infecting them with the virus of rat plague obtained from the Pasteur Institute. The Director was asked by the Hon. J. Turner to superintend the experiment. The results were entirely negative, and it would appear that the field rats are immune to the poison. A large series of skins was made of rats found on the estates and it seems that the rat which does the damage and which is present in vast numbers, is the recently described rat *Mus jalorensis*; while the rats found about the houses and mill belong to two varieties of *Mus rattus*.

A "mealy bug" which attacks sugar canes was also studied at the same time and a note on it was published in the first number of the "Journal of the Federated Malay States Museums."

Tailings Commission.

The Director was appointed a member of this body, and attended the meetings held at Batu Gajah, Kuala Lumpur and Seremban.

Protection of Wild Animals and Birds.

An Enactment, which is of considerable importance from a zoological point of view, was passed in Perak, Selangor and Negri Sembilan under the title of "The Wild Animals and Birds Protection Enactment, 1904." Although this law hardly goes far enough, in some directions, it is hoped that it will do something towards checking the indiscriminate slaughter which threatened to exterminate some of the rarer and more interesting of our wild animals and birds and seriously decrease the numbers of others.

Many people have an exaggerated idea of the quantity of animal life in the jungle, and think that protection is quite unneeded. When, however, the action of sportsmen in exterminating many once very common species of animals in Africa, America and other places is taken into account, the necessity of protective legislation becomes apparent. What is usually forgotten in considering this subject is that the balance of life in the natural state is so finely adjusted that it only requires quite a small matter to upset it.

The Journal.

In the latter part of the year the first number of the "Journal of the Federated Malay States Museums" was prepared ready for issue early in January of 1905. This part contained 37 pages of letter-press and three plates. It is proposed to issue four parts of the Journal in the year. The price has been fixed at 75 cents per part, or $2.50 per volume of four parts.

L. WRAY,
Director of Museums, F.M.S.

REPORT ON THE PERAK MUSEUM, 1904.

BUILDING.

THE four towers at the front of the building were in the contractor's hands for the greater part of the year, the scaffolding and ataps being still in position at the end of December. The removal of the small domes and the substitution in their place of four pyramidal-shaped towers with galvanized iron roofing was, however, completed before the close of the year. It is to be hoped that the alteration will be permanently effective as I believe there has always been trouble with these towers. The result from an artistic stand-point can hardly be deemed a success, and it is a matter of regret that the exterior appearance of the building could not have been studied in conjunction with the absolute necessity of having water-tight roofs.

CASES.

The last instalment of the plate glass for the new ethnological wall- and table-cases arrived from the Crown Agents early in the year, and the remaining cases were accordingly glazed, being finally ready to receive the collections by the end of May.

After the removal of the ethnological specimens from the two front rooms, the interiors of all the wall-cases there received two coats of fresh white paint previous to the instalment of their new contents.

THE COLLECTIONS.

1. Zoology and Osteology.

A fair amount of work has been done in both these branches, though owing to the lamentably crowded condition of the zoological collection, it is impossible to make much progress until the completion of the original design of the building in this room by the erection of a gallery over the wall-cases. This would dispose of the greater part of the invertebrates, and thus make room for a better and more natural display of the larger mammals. The only way to meet this demand is by the erection of pier cases in the centre of the room; and a glance at such animals as the tigers, Sumatran rhinoceros, Malayan tapir and the mountain goats under their present cramped and inartistic conditions should convince anyone of the pressing necessity for this improvement. Blessed with such fine examples of the mammalian orders as Perak is, it seems more than a pity that, in addition to the poor representation of the above animals, such beasts as the sladang, the sambur stag and others have to go unrepresented in the State Museum. Invertebrate zoology is also at a standstill from the same cause, so that the comparatively small outlay necessary for the remedy would, in a way, serve two purposes. The last two orders of the mammalia have already encroached on the bird gallery, and the fine specimens of the Cetacea have had to be stowed away under one of the table cases.

The extension of the mammalia across the room led to the re-arrangement and re-classification of the bird collection; and an effort was made to collect all the scattered spirit reptilian specimens into the

zoological room. These will eventually, however, fall into their scientific sequence, more or less, by exhibition in the passage which leads into the new ethnological wing.

The Sumatran rhinoceros, mentioned above, which had been set up by Mr. Keilich previous to his going on leave, was removed from the work-rooms and placed in position amongst the ungulates; though, as hinted, the beauty of the specimen and the clever taxidermic work is entirely thrown away in its present situation.

Minor additions were made during the year, but owing to adverse circumstances no systematic zoological collecting was carried out. Twenty-one skins were purchased from the Selangor State Museum, collected from Cameron's Plateau, Batang Padang, by the Dyak collector attached to that establishment; and others from the Gap were collected and presented by Mr. H. C. Robinson.

The Japanese spider crab presented to the Museum by Sir J. P. Rodger, K.C.M.G., previous to his leaving the State, was provisionally exhibited in the Economic Department, pending an allotment of a favourable position in the zoological room.

Towards the end of the year the task of cataloguing this collection was started, and it is hoped the work will be completed during the current year.

A small amount of outside taxidermic work was got through, but a good deal had to be refused owing to the pressure of Museum work.

The whole of the osteological collection was re-arranged systematically, the removal of ethnological specimens enabling three more wall-cases to be devoted to this important branch of natural science. The large mammalian skeletons standing unprotected on the top of the wall-cases were taken down, cleaned and placed inside cases; and the avian and reptilian skeletons were removed from the table-cases and placed in their proper sequence. Also the large skull of the elephant "Petra Muda," formerly exposed to the depredations of native visitors, was put away in safety amongst the other ungulate skulls.

The skeleton of a 7-ft. crocodile (*C. porosus*) was prepared and articulated, and makes a welcome addition to the collection; as does likewise the interesting series of tiger bones presented by Mr. W. G. Maxwell, including a malformed femur, arising from an old bullet wound.

2. Botany.

Two hundred and ninety-four botanical specimens were received in August from the Royal Botanical Gardens, Calcutta, and a few minor additions were obtained from various sources.

Ten thousand Para rubber seeds, from the trees in the Museum grounds, were collected and sold.

Considerable trouble was caused during the year by the sudden and ruinous attacks of white ants, which made their way through the floor of the building, from time to time, into the cases containing the botanical collection. It became painfully obvious that the contents of the Herbarium were never safe; and to meet this difficulty long zinc

baths have been made to take both front and back feet of the cases. These are kept supplied with a mixture of kerosene and earth oils, but, as the plan was only put into effect at the end of the year, it is too early to judge of the results of the experiment. Anyhow, it is most important that every effort should be made to preserve this valuable and comprehensive collection of Malayan plants from destruction or damage.

3. Geology and Mineralogy.

Very little was done in either of these departments, as during 1905 both will undergo entire re-arrangement, and substantial additions will be made by the inclusion of a collection, presented by the Trustees of the British Museum (Natural History); and another brought from England by Mr. Leonard Wray early in 1904. This important work had to be postponed, pending the clearance of the economic exhibits into the adjoining room.

Both collections were enriched by the Director of Museums' collecting trip through Pahang in June; and in November a generous offer was received from Mr. J. W. D. Marshall, of Bristol, England, of a donation of Jurassic fossils, which needless to say was accepted, and when received should greatly enhance the value of our geological collection.

A portion of coal from Upper Perak, presented by Mr. D. Pasley, and exhibited in one of the table-cases, proved a great attraction to European visitors.

4. Economics.

Although this collection has been in embryonic existence for years past no particular prominence has been given to it, owing to the lack of accommodation. The clearing out of the ethnological collection, however, placed the room on the north wing of the building at command. It will now be possible to extend and advance this branch of scientific research, the usefulness of which will be apparent to everybody. With the kindly help of Planters, Miners, District Officers and others in a position to assist, a collection of considerable interest and value, illustrative of Perak products, industries and manufactures, should eventually be formed.

Experiments with Para rubber seeds, collected in the grounds, were carried out in the Museum laboratory, with a view to collecting data on the quality and economic value of the oil to be obtained from them. A sample of this oil was placed in the collections, and seeds and plaster models of the entire pod, previous to bursting, were also added. Plaster models of typical Malayan fruits cast from the originals have added to the attraction of those already on exhibition, conspicuous amongst which now is a section of a durian. A series of sugar-canes from the Rubana Estate, Lower Perak, was treated in the same way, though the finished models were not ready for exhibition by the end of the year.

Three wall-cases have been allotted to agricultural implements, many of which were crowded out of the Ethnological Department; and one bay is devoted to rotans.

5. Ethnology.

It was in this department that the attention of the staff was principally concentrated throughout the year. Not only have the ethnological collections been bodily removed and re-arranged, but large additions have been made. In June a prolonged tour through Pahang was made by the Director of Museums, and an extensive collection of Malayan objects from that State, previously unrepresented in the State Museum, was the result. Further augmentations were made through the medium of the Agri-Horticultural Show, held at Kuala Lumpur in August; from various trips made by the Director of Museums, and from native collectors, who from time to time brought things in to the Museum.

The new ethnological wing was thrown open to the public on the 21st December, and a casual inspection of the two rooms will give a fuller appreciation of the actual work done during the year than can be conveyed in this report by written details. The annexe is entered from the farther end of the zoological room, where a marble paved passage, $33\frac{1}{2}$ ft. × 11 ft., leads into the lower or general ethnological room. The exhibits in the passage were not definitely arranged, but the wall-cases here will eventually hold certain orders crowded out of the zoological room. The general ethnological room is divided up amongst: India, Arabia, Japan, China, Fiji, Papua, Siam, Borneo, Java, Nias (principally the Cerruti Collection) and Sumatra. The main portion of the collections are contained in wall-cases, and the smaller objects in table-cases. Space has also been found in this room for what may be called Malayan archæology, two of the wall-cases being devoted to antiquities, one to history, and one each to weights and measures. In addition, one tier of table-cases has been allotted to history and one to antiquities, incorporated in the latter being the Hale collection of Peninsula stone implements and the Wray collection of British flint implements.

A single bay of the wall-cases has an exhibition space of 6 ft. 5 ins. high × 8 ft. 8 ins. wide × 2 ft. 7 ins. deep, each divided into two sheets of plate glass, 3 ft. 10 ins. × 6 ft., which gives an uninterrupted view of the interior, there being no cross bar as in the old cases. There is a total length of 87 ft. of table-cases divided into four tiers, and glazed with sheets of plate glass, 2 ft. × 3 ft. 2 ins. The centre of the room is occupied by Malay cannons, and all the available wall space has been used to the best advantage, that at the staircase end for the display of Malayan paddles and oars and the series of photographic enlargements of Asiatic races.

A good wide staircase leads up to the upper or local ethnological room, the walls along the stairs having been partially covered with exhibits (mostly spears), to be augmented later by other specimens and photographs. At the top of the stairs is a small landing which at one end opens directly into the upper room: thanks principally to the untiring energy and perseverance of the late Curator, Mr. Leonard Wray, it is not too much to assert that Perak has here the finest and most comprehensive collection illustrative of Malayan ethnology extant.

The wall-cases in this room are identical with those below, there being nine a-side and four at the top end. The first four bays have been given over to the aboriginal tribes of the Peninsula—viz., two for Semangs and two for Sakais. The other 18 bays have been entirely devoted to Malayan objects, and are divided up under the following heads:—Domestic, Fishing, Traps, Transport, Pottery, Mat and Basket Work, Weaving, Spinning, Metal and Wood Work, Toys, Games, Music, Plays, Customs, Religion and Magic. The table-cases are similarly apportioned and are arranged in seven tiers, running the breadth of the room, each tier 24 ft. long. The plate glass is larger than that in the lower room, each sheet having a length of 3 ft. 10 ins. In these table-cases, as well, have been re-arranged the collections of Malayan weapons ($2\frac{1}{2}$ tiers) and Malayan silver work ($1\frac{1}{2}$ tiers), the latter looking well mounted on a dark sage green baize. Also half a tier has been given to Malayan art work. The large wall space at the entrance end has been used for a portion of the collection of spears, it having been found impossible to concentrate these weapons in one place.

An innovation in both of these rooms has been made in the general labelling of the contents of each case which, I think, will be found at once effective and pleasing to the eye. Over each bay has been fixed a glazed title, mounted in an enamelled zinc frame, and which can be slipped in and out and changed *ad. lib.* The same principle has been adopted with the table-cases, the frame holding the titles being made in the shape of a triangular stand, which shows a name each side. By this arrangement, in addition to serving the purpose of clearly notifying the contents of each case, any particular class of exhibits can be located on entering the room, the names being in black on white and easily decipherable at a distance.

A valuable historical gift was received from Mr. Eric Maxwell, of Ipoh, in the second (and larger) instalment of the Old Dutch engravings of the Temple of Boro Boedoer, Java, the first lot having been presented to the Museum in 1902.

Cataloguing was also commenced in this department, as in the Zoological Department, before the end of the year.

THE LIBRARY.

Twenty-four additions were made during the year, exclusive of periodicals, reports and pamphlets, 12 volumes purchased out of the Book vote, and 12 volumes presented. 39 volumes were lent to qualified applicants, which is a slight decrease on that of the previous year. It would appear, however, that it is not generally known that the Museum possesses a reference and loan library.

The same trouble of attacks by white ants was experienced here as with the herbarium, and has been met in the same way. In something less than three days these pests made their way through the floor of the building into one of the book-cases and utterly destroyed a large pile of pamphlets and catalogues. Fortunately there was nothing of any great value, though in one or two instances the loss is beyond replacing.

List of Donations to the Library, 1904.

Hanitsch, Dr. R.:
"On a collection of Coins from Malacca."

Imperial Institute:
"Technical Reports and Scientific Papers, 1903" (2 copies.)
"Bulletin of the Imperial Institute," vol. 1.

King, Sir George:
"Materials for a Flora of the Malay Peninsula," parts 14 and 15.

Morris, Sir Daniel:
"The West Indian Bulletin," 5 numbers.

Robinson, Mr. H. C.:
"Some Preliminary Results of an Expedition to the Malay Peninsula" (2 copies), "*Man*," August No.

Secretary to Resident, Perak:
"Abstracts of Proceedings of the Linnean Society, of New South Wales," complete for 1904.
"Agricultural Bulletin of the Straits and Federated Malay States, 1904," vol. III. complete.
"Le Bulletin Société de Geographique Commercial."
"La Caoutchoue et la Gutta Percha," May to October Nos.

Secretary to Resident, Perak—(*cont.*)
"Fasciculi Malayenses."
Anthropology, Parts I & II.
Zoology, Parts I & II.
Supplement, Map and Itinerary.
"Hikaiat Misa Perbu Jaia."

Smithsonian Institute, U.S.A.
Bulletin (No. 52) and Proceedings (vol. 25) of the U.S. National Museum.

Viloonchevitch, Mr. J.:
"Journal d'Agriculture Tropicale," No. 29.

Reports, Pamphlets, Papers, etc., from the—

Gizeh Zoological Gardens, Egypt.
Indian Museum, Calcutta.
"Louisiana Planter."
Montevideo National Museum.
Otago University Museum.
"Perak Pioneer."
Philippine Museum.
Plymouth Museum and Art Gallery.
Raffles Library and Museum, Singapore.
Royal Botanic Gardens, Calcutta.
Royal Botanic Gardens, Ceylon.
Royal Botanic Gardens, Kew.
Sarawak Museum.
"Singapore Free Press."
"Times of Malaya."

Registration.

Two newspapers were registered under the "Book Registration Order in Council, 1895."

(1) "The Times of Malaya and Commercial Advertiser of the Federated Malay States and Straits Settlements," No. 1, published at Ipoh, on 9th March.

(2) A Weekly Mail Edition of the same paper, issued for the first time on 3rd November.

Four petitions for Grants of Exclusive Privileges were registered in accordance with the "Inventions Order in Council, 1896," and the Meteorological Returns for all Perak Stations were received monthly from the State Surgeon.

ACCESSIONS.

The list of donations for 1904 is neither extensive nor of great importance, and needless to say I should very much like to see an improvement in this direction during the current year; more so as I feel certain that such improvement is quite within the bounds of possibility if the European community of the State would only remember that a Government Museum actually existed, and that the welfare and ultimate success and utility of such an institution depends almost as much on the united help and active interest taken in it by the populace at large as it does upon its chief officer and staff.

List of Donations to the Museum for 1904.

Ahamat Zin:
Rock Lobster (*Palinurus sp.*)

Allen, Mr. M. A. V.:
Specimens of Tin-ore from Heawood Estate.

Barnard, Mr. B. H. F.:
Snake (*Trimesesurus gramineus*).

Barnard, Mr. H. C.:
Praying Mantis (*Mantis sp.*)

Bryant, Mr. F. J.:
Specimen of Scheelite from Kinta.

Cornwell, Mr. J.:
River Tortoise from Trolah (not yet identified).

Cuscaden, Mr. G. P.:
Green Pigeon (*Osmotreron olax.*)

Duxbury, Mr. E. L.:
Hammer Oyster (*Malleus sp.*)

Gow, Mr. A.:
Minerals from Ipoh Marble Quarry.

Haji Ismail:
Seal of the Muntri of Larut.

Hanitsch, Dr. R.:
Four Clay Images of Buddah from Islands off Trang, Western Siam.

Keilich, Mr. E.:
10-cent Hong Kong coin.
Turkish coin.
Brazilian Opal.
Malayan Bamboo Tobacco Box.

Maxwell, Mr. Eric:
Engravings and Plans of the Temple of Boro Boedoer.

Maxwell, Mr. W. Geo.:
Bones of Tiger (*F. tigris*) including a femur malformed from old bullet wound.

Pasley, Mr. D. Q. W.:
Specimen of Coal from Upper Perak.

Plant, Mr.:
Malay "back-board."

Public Works Department
Portion of Chengai beam from District Surgeon's Quarters, Taiping, destroyed by white ants.

Rabe, Dr. Jno.:
Three cones of the Californian Big Tree (*Sequoia giganteus.*)

Three specimens of Moss Agate from Nevada, U.S.A.

Three land shells from Normandy Islands, British New Guinea.

Robilliard, Mr. H. P.:
Six young Crocodiles (*C. porosus*).

Robinson, Mr. H. C.:
Collection of bird-skins from the Gap.

Night-jar (*Batrachostomus stellatus*).

List of Donations to the Museum for 1904—(*cont.*)

Rowe, Mr. J.:

Minerals from Tronoh.

Rowley, Mr. T. W.:

Rostrum of Saw Fish (*Pristis perrotteti*) (two specimens previously on loan).

Rubana Estate, Telok Anson:

Five specimens of Sugar Canes.

Sayers, Mr. W.:

Cocoa Pod (*Theobroma cocoa.*)

One unused 1-cent Straits stamp.

Selangor Museum:

Three old Iron Implements (? Malay).

One specimen of Mineral from Ampang Mine, Selangor.

One specimen of Rock and three specimens of Minerals from Rhin Valley, Jelebu, Negri Sembilan.

Series of Tin coins from Malacca.

White Snake (*Coluber taeniurus*).

Toad (*Nectes subasper*).

Selangor Museum—(*cont.*)

Collection of Papuan weapons.

Japanese Swords.

Dyak Swords.

Shaw, Mr. G. E.:

Old Land Title, Krian District.

Sibbald, Mr. S. K.:

Burrowing Snake (*Cylindrophis rufus*).

Venning, Mr. F. E. W.:

Two Snakes (*Calliophis bivirgatus* and sp.)

Toad (*Bufo asper*).

Watson, Mr. E. L.:

Large Malayan Squirrel (*Ratufa bicolor*, var.)

Wray, Mr. Cecil:

Forty-six Minerals from Kinta

Wray, Mr. Leonard:

Minerals and Fossils from England.

Yong Fook, Mr.:

Bale Fruit (*Aegle mamelos*).

Owing principally to the inadequacy of the Personal Allowance and Transport vote, and secondly to the pressure of work in the Museum itself, I was unable to make any collecting trips; but, as hinted above, the collections were considerably enriched from the various trips made by the Director of Museums. $860.54 was spent in acquisition of specimens from the Museum Expenses vote, the greater number being ethnological objects.

ATTENDANCE.

The attendance for the year was extremely good, and the keen interest shown by the individuals of the various Asiatic races in the exhibits is distinctly encouraging. Notices of the hours of opening, generously printed by the Government Printer in three different languages—Malay, Chinese and Tamil—before that department was finally transferred to Kuala Lumpur, were placed at the entrance of the Museum in September.

The total number of visitors for the year reached 52,854—the largest yearly aggregate yet recorded in the history of the Perak Museum. The institution was opened to the public 292 days, making a daily average of 181. An experiment was made in keeping the

Museum open the whole of the Taiping Race Week—*i.e.*, not closing on the afternoons of the races as is the case in Government offices. The venture met with a surprising result, the first day the turnstile registering 1,760 visitors—the largest daily attendance on record. On 1st February (Hindoo festival of Tai Pusum) the turnstile again registered over the thousand, the exact number being 1,110. The minimum attendance was reached on 28th July, when only 36 visitors passed in; this total, I am glad to say, being exceptionally low.

The annual attendances for the present century are:

1901.		1902.		1903.		1904.
40,644	...	40,022	...	46,685	...	52,854

The Museum was closed on the 20th December to permit of the final arrangements being made for the opening of the new ethnological wing.

On the 22nd July, H.E. the Governor of the Straits Settlements and High Commissioner of the Federated Malay States, Sir John Anderson, K.C.M.G., paid an official visit to the Museum and expressed himself well pleased with all he saw.

STAFF.

Mr. Leonard Wray, Curator and State Geologist, returned from long leave on the 8th January, and took over from Mr. Keilich who had been acting for him.

On the 21st March Mr. E. Keilich, Taxidermist, left for three months' vacation leave and 12 months' on half pay, and Mr. Yong Fook, Assistant Taxidermist, was appointed to act for him.

In March, Mr. Leonard Wray, I.S.O., was made Director of Museums, Federated Malay States; and shortly after Mr. Fred. W. Knocker, Settlement Officer, Negri Sembilan, was appointed to the Curatorship and assumed duties on the 8th May.

On the 6th October, Mr. N. Bappoo, Clerk and Caretaker, proceeded to India on two months' leave, which was afterwards extended by one month on no pay. He reported his return to duties, however, on 19th December.

FINANCIAL.

$1,721.89 of the vote for Museum expenses was defrayed on the building, cases, materials and general stores, there being a saving of $17.57 for the year, the balance of the vote, as noted previously, being spent on purchase of specimens.

The laboratory vote of $250 was spent in full; and out of the $100 for purchase of books, $88.27 was utilised.

The revenue collected amounted to $150.85; $100 of this being for Para rubber seeds.

NOTES AND OBSERVATIONS.

Considerable time and thought was spent during the year in devising a practical working scheme for recording and cataloguing, not only recent accessions, but all specimens contained in the collections and laboratory; and it was decided that a card catalogue would best meet the peculiar demands and circumstances of the case. Accordingly an oak cabinet was obtained from England through the Crown Agents, with cards formulated to contain all information connected with a specimen necessary for preservation, and the serious task of cataloguing was commenced towards the end of the year. The scheme briefly is divided into two separate catalogues: (1) according to the order of acquisition, a fresh set of serial numbers to be started with each year; (2) according to location in the Museum, this latter series being more or less a departmental catalogue. The cards of each catalogue are duplicates—*i.e.*, the description of a single specimen is identically the same on the cards of both catalogues. For the purpose, each room in the Museum has been given a letter and each case a number, a complete set of numbers being used for each room.

Thus it can be easily understood that any single specimen, or any particular group of specimens, can at any time be expeditiously hunted up and their history examined.

The difficult and important question of effective labelling has yet to be dealt with. A few new hand printed labels were attached to new specimens during the year, and the advantage of these over the old type-written labels is at once perceptible. But the time alone that these labels take to print makes their extensive use prohibitive—unless indeed a number of expert ticket printers were exclusively employed at the work, which, however, in this country, is practicably impossible. It is hoped to deal finally with the problem during the current year.

In concluding this report, I should like to draw the Government's attention to the educational value of its Museum, which up to the present seems to have been overlooked, or at any rate under-estimated; thus, one of the principal aims of a Museum is lost. The time has now gone by when Museums were looked upon as mere store-houses for an unintelligible array of so-called "curios," or as the hobby-horses of a few eccentric men. Great Britain has followed in the footsteps of the Continent and America in this direction, and attendance at the local Museum has for years past been included in the curriculum of many London and Provincial schools. I have myself seen the practical results derivable from this method of instructing the young; and from past personal experience, and after mature consideration, I see no reason why Taiping should not avail itself of the great advantage placed at its command. Even in the present conditions of the Museum collections practical demonstrations could be made towards an elementary acquaintance with the fundamental laws that govern nature and the animal kingdom, or a rudimentary knowledge of anatomy: and the scope of the economic and geological sections, when in order, will be invaluable in a country such as this. It is intended, moreover, to further improve certain collections with this end in view. Such instruction gives the pupil food for thought, teaching

him to exercise his mental capacity in a free and independent way; and this appears to me to be highly desirable amongst the class of scholars aspiring to an English education in this country.

MEAN DAILY AVERAGE OF VISITORS TO PERAK MUSEUM DURING 1904.

Month.	Days open.	Maximum.	Minimum.	Total.	Daily average.
January	24	247	102	4074	169.75
February	22	1110	88	5677	258.05
March	27	899	84	5955	220.55
April	22	273	97	3803	172.86
May	24	256	100	4432	184.66
June	23	360	96	4281	186.13
July	26	263	36	4225	162.50
August	25	1760	86	6153	246.12
September	26	334	49	3140	120.77
October	26	289	74	3460	133.07
November	25	295	46	3774	150.96
December	22	336	53	3880	176.36
	24.33	535.16	75.91	4404.50	181.81

FRED. W. KNOCKER,

Curator, Perak State Museum.

REPORT ON THE SELANGOR MUSEUM 1904.

COMMITTEE.—The Committee at the commencement of the year consisted of the following gentlemen—viz.,

Mr. B. E. Shaw (*Chairman*)

Mr. H. M. Burn-Murdoch
Mr. E. V. Carey
Dr. C. W. Daniels
Mr. H. C. E. Zacharias was added to the Committee on 5th February
Dr. G. F. Leicester
Mr. J. H. Pye
Mr. H. C. Robinson (*Curator*)

One meeting was held on 29th January, but Mr. L. Wray, I.S.O., having been appointed Director of Museums, F.M.S., on 17th March, the members were relieved of their duties on 6th May, and the thanks of the Selangor Government conveyed to them for the time and energy they had expended in the past in the interests of the Museum.

EXPENDITURE.

I. On the vote of $4,183 for "Personal Emoluments" there was a saving of $356.26.

II. $3,500 was voted for "Other Charges," which was expended as follows:

(i)	Collecting Trips and Transport ...	$982.94*
(ii)	Specimens	639.55
(iii)	Apparatus (including Camera and accessories and Hammond Typewriter	901.53†
(iv)	Books and Periodicals	283.64
(v)	Furniture, Fittings and Repairs ...	365.90
(vi)	Preservatives, Collecting and Cleansing Materials	158.37
(vii)	Freight, Postage and Sundries ...	102.59
(viii)	Uniforms for Watchmen	30.00
(ix)	Local Transport	14.06
	Total ...	$3,478.58

III. A sum of $6,000 was placed in the 1903 Estimates to provide cases and fittings for the new Museum. After much consideration it was decided to follow substantially the pattern used in the recent additions to the Perak Museum, and floor plans were prepared embodying these designs.

The frames of the cases are to be of chengai, and the tops, bottoms and sides meranti. The fronts are of ¼″ polished plate glass, each door containing one piece only.

Sufficient timber for the bulk of cases was purchased in September and stacked in the Museum grounds to season, towards the middle of November work was commenced.

The following charges were incurred on account of this vote:

(i)	Timber	$931.37
(ii)	Freight and Handling Charges... ...	245.98
(iii)	Work-shed	130.00
(iv)	Case Fittings, Hinges, Bolts and Locks	378.72
(v)	Sample Tins for Economic Products ...	36.00
(vi)	Carpentering	75.00
	Total ...	$1,797.07

IV. $250 was granted for the investigation of the "Life History of the White Ant (*Termes gestroi*) as affecting Para Rubber," and of this sum $140.43 remained unexpended at the end of the year.

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* Of this amount $127.59 is properly chargeable to 1903 expenditure.

† Including $98.41 Crown Agents' bills on account of 1903 services.

REVENUE.

Charges for work done for private persons and sale of surplus specimens realised $206.91, excluding a sum of £4 not yet collected. Of this amount, however, $134.46 represents specimens purchased on account of other Museums and is only entered here for purposes of book-keeping.

Authority was obtained to expend this revenue in additions to the Museum collections, and the money was principally devoted to the purchase of ethnographical specimens, $192.45 having been thus spent.

VISITORS.

The number of visitors during the year 1904 amounted to 34,470, about a thousand more than in 1903 and about equal to the attendance for 1901. Account should be taken of the fact that the number of hours during which the Museum was open to the public was about 10 per cent. less than in previous years. Of the total number of visitors, the percentage distribution according to race was as follows :

	1902.	1903.	1904.
	%	%	%
Europeans	1.2	1.3	1.9
Eurasians	2.8	2.5	4.7
Bengalis	4.1	3.9	5.1
Tamils	19.7	16.7	17.9
Malays	27.2	22.7	20.4
Chinese	45.0	53.1	50.0
	100.0	100.0	100.0

Assuming that the relative proportion of the various races comprising the population of Kuala Lumpur have not altered appreciably during the last two years, these figures point to a considerable increase of interest in the Museum among the European and Eurasian inhabitants, others remaining practically stationary.

LIBRARY.

The Trustees of the British Museum presented eighteen volumes of their publications and the Perak Museum seventeen volumes of miscellaneous works. Nineteen others were purchased from the vote provided for the purpose, not including several numbers of scientific periodicals.

APPARATUS.

A. Dallmeyer 1/1 plate camera and accessories were purchased and also a Hammond typewriter; this form of instrument being the only one adapted for writing Museum labels.

EXCHANGES.

Correspondence has been carried on and exchanges effected with the following Museums:—

The British Museum.

The Imperial Indian Museum, Calcutta.

The Pitt Rivers Museum, Oxford.

The Hope Department, University Museum, Oxford.

The Raffles Museum and Library, Singapore.

The Royal Museum of Zoology and Ethnography, Dresden.

An arrangment has been made with Prof. Ray Lankester, Director of the British Museum (Natural History), whereby unique specimens are to be deposited in the British Museum, while in return the staff of that institution will as far as possible identify collections of insects and other animals which may become of economic importance.

A small collection of insects, illustrating certain problems connected with protective and warming coloration and mimicry, was sent to Prof. Poulton, the leading authority on this branch of natural science.

PUBLICATIONS.

In conjunction with the Perak Museum, and under the editorship of the Director of Museums, F.M.S., a periodical has been started which will contain articles dealing with zoology and ethnology and other matters connected with the F.M.S Museums. The first number, consisting of thirty-seven pages with three plates, was passed for press during 1904 and published in January of this year.

A short article on certain zoological subjects was contributed to the "Journal of the Straits Branch of the Royal Asiatic Society," and another to the "Ibis," the leading Ornithological Journal.

ECONOMIC ZOOLOGY.

The Curator served as a member of the Fisheries Committee, whose report was published in August. Investigations were carried out on the White Ant (*Termes gestroi*) as affecting para rubber and the conclusions arrived at published in the *Gazette*. The life history of a moth (*Rhodoneura myrsusalis*), which does considerable damage to getah taban, was also the subject of enquiry.

ADDITIONS.

I. ZOOLOGICAL.

A large number of collecting expeditions were undertaken during 1904, both by the Curator and collectors, and by the latter alone. The results were very satisfactory, and numbers of very rare species hitherto known by two or three examples only, were secured, the total number of additions falling not far short of four thousand. The following species may be mentioned as specially worthy of note, those marked with an asterisk being new to the Museum collections.

(*a*) *Mammalia.*

1. Hylobates syndactylus*
2. Semnopithiens obscurus*
3. „ miratus*
4. „ albocinerens*
5. Hipposiderus larvatus *
6. Tupaia malaccana *
7. Ratufa bicolor and vars
8. Sciurus erythræus
9. Mus surifer *
10. „ validus *
11. „ ciliatus *
12. „ jarak *

No. 11, which is an extraordinarily large species, was obtained on the summit of Bukit Kutu, while No 12 was trapped on Pulau Jarak. The latter is certainly new to science.

(*b*) *Aves.*

The bird collection has always been a strong feature of the Selangor Museum, and with the additions noted below the collection becomes almost equal to that of Perak and far superior to that of the Singapore Museum, at least as far as the Peninsula fauna is concerned. The following are some of the more important additions:

1. Arboricola campbelli *
2. Osmotreron bicincta *
3. Calænas nicobarica *
4. Ardea cinerea *
5. Sula sula *
6. Glaucidium brodiei *
7. Chrysophlegma wrayi *
8. Lepocestes pyrrhotis *
9. „ porphyromelas *
10. Geocichla davisoni *
11. Campephaga neglecta *
12. Dicrurus annectans *
13. Hemipus picatus *
14. Minla soror *
15. Niltava decipiens *
16. Pteruthius æralatus *
17. Tephrodornis gularis *
18. Corythocichla leuosticta *
19. Turdinulus humei *
20. Muscicapula hyperythra *
21. „ westermanni *
22. Cyanoderma erythropterum*
23. Zosterops aureiventer *
24. Phyllornis hardwic kiik *
25. Digenea malayana *
26. Cryptolopha davisoni *
27. Collocalia linchii *

Many of these species are specimens of extreme rarity. No. 1 is a new species of hill partridge very distinct from any other hitherto known; of *Turdinulus humei* only two specimens are known to exist, one in the British Museum and the other in the Hon. W. Rothschild's collection at Tring. The definite occurrence of *Calænas nicobarica*, the Nicobar ground pigeon at Pulau Jarak, settles a long disputed point as to its occurrence in the Malay Peninsula.

(*c*) *Reptilia.*

Numerous specimens of lizards were collected, several being of considerable interest. Worthy of special notice are a large collection of flying lizards, including *Draco tæniopterus*, previously known from Siam and Tenasserim only, specimens of *Gymnodactylus consobrinus*, a Bornean species new to this fauna, and of *Gonyocephalus grandis*, originally described from Penang, but so rare that only one other specimen has been recorded in over fifty years, were also captured

(*d*) *Amphibia.*

Considerable collections of frogs were made, principally in the hills, amongst them may be mentioned the following rare species:

1. Rana nicobariensis
2. ,, nigrovittata
3. Ixalus asper
4. ,, pictus
5. ,, castanomerus
6. Rana jerboa
7. Bufo jerboa
8. Nectophyrne guentheri
9. Megalophrys longepes
10. Rhacophorus leprosus
11. Microhyla annectens

Ixalus castanomerus is a species new to science, which will shortly be described and figured in the "Museums Journal," while several others are either new to the Peninsula or only known from the Larut Hills.

It is impossible to go into detail concerning other groups of the animal kingdom.

A large collection of butterflies was made in the Batang Padang district, and of other orders of insects on Bukit Kutu, but these have not yet been worked out and identified.

II. ETHNOLOGY.

The additions in this department are numerous and important. Advantage was taken of the Agri-Horticultural Show held in August, and numerous purchases were made thereat, including several rare and obsolete specimens. Amongst them may be mentioned a fire syringe (gobi api) and a set of moulds for casting "Jalor" chains in one piece. During a journey through Negri Sembilan a large collection of the pottery of that State was made, and a few good examples of krises and native silver purchased, including a type of bracelet peculiar to the district.

Special attention has been devoted during the year to the subject of Malay carving, and the Museum now possesses a fine collection of panels mostly from Linggi and Rembau.

Amongst donations the Museum is indebted to the Acting Resident Councillor of Malacca for a most valuable gift consisting of a set of the tin tokens, struck at Malacca shortly after its conquest by Albuquerque and later Portuguese Viceroys, and which have lately been described and figured by Dr. Hanitsch in the Journal of the Straits Branch of the Royal Asiatic Society.

Four boat-shaped ingots of tin, found in the foreshore at Pulau Pinto Geding, and probably of Malay origin, should also be mentioned.

III. MINERALOGY.

The additions in this department are mainly derived from collections made by the Director of Museums, but a few samples of tin ore have been obtained from the Kuala Lumpur district and from Jelebu.

The Straits Trading Co. presented a large mass of tin ore from Sungei Besi, weighing over three pikuls.

IV. ECONOMIC PRODUCTS.

Various sample tins containing agricultural products were presented by the Perak Museum, and a series of named rice samples purchased at the Agri-Horticultural Show are being prepared and sterilized at that institution, this Museum not yet possessing the requisite apparatus.

DONATIONS.

The following gentlemen and institutions have presented specimens to the Museum:

Mr. R. N. Bland	The Perak Museum
Mr. A. B. Cross	Mr. N. W. Reid
Mr. A. Von. Geyzel	The Singapore Museum
Mr. C. W. Harrison	The Straits Trading Co.
Dr. Johnstone	Dr. Travers
Mr. A. M. Burn-Murdoch	The Revd. F. Swindell
Mr. O. V. O'Hara	Sir W. H. Treacher, K.C.M.G.
Mr. P. W. Parkinson	

CONSERVATION.

The collection of stuffed birds has been cleaned, repaired and re-labelled, and is now in excellent condition, the series of bird skins has been stored in glass topped boxes, each species in a separate box, which facilitates reference and obviates damage caused by careless handling. The fish, reptiles and amphibians have had the preservative fluid renewed, the only vertebrates yet requiring attention being the mammals.

The collections of insects, etc., made during the year, have mostly not been mounted, as it has been found hopeless to protect them from the attacks of mites and mould under existing conditions.

As regards the ethnographical collections it has been deemed expedient to place the valuable silver exhibits in the Treasury as it was discovered that during the period the Museum was without a Curator five valuable pindings with gold centres had been abstracted from the collections.

Nearly two months was spent in thoroughly cleaning the krises, spears and other weapons, which were in a dirty and rusty condition. They have now been coated with a preparation of paraffin wax, which prevents the access of air, and will it is hoped preserve them from rusting indefinitely. Other articles which admit of such treatment were immersed in a solution of corrosive sublimate, and so rendered immune to further insect damage.

The bulk of the acquisitions during the year have been packed in tin lined cases pending the completion of the new buildings.

The Dyak collectors worked hard and their conduct was most satisfactory. It was found possible to send them into the jungle without supervision and with satisfactory results. The type of Malay whom it is possible to engage in Kuala Lumpur is not accustomed to the jungle, and by the time he has been trained to be of any use whatever he has probably tired of his employment.

H. C. ROBINSON,
Curator, Selangor Museum.

ON A NEW SPECIES OF WHISTLING-THRUSH FROM SELANGOR.

BY W. R. OGILVIE-GRANT,

BRITISH MUSEUM OF NATURAL HISTORY.

MYIOPHONEUS ROBINSONI, *sp. nov.*

ADULT MALE.—Most nearly allied to *M. cyaneus*, from which it differs in having the greater part of the bill yellow, only the ridge and the tip of the culmen being blackish, and the basal portion of the feathers of the under parts pure white. General colour above and below, black slightly glossed with purple, the feathers of the chest with shining tips; lesser wing coverts purplish blue, forming a conspicuous patch.

Total length about 10 inches, culmen 1.2, wing 5.4, tail 3.9, tarsus 1.8.

HABITAT.—Gunung Mengkuang Lebah, 5,200', Selangor, 1st February, 1905.

[The Whistling-Thrushes comprise about fourteen or fifteen species ranging from Turkestan to China and found also in the islands of Ceylon, Sumatra, Java, Borneo and Formosa. They are all very much alike, their plumage being usually some shade of dark blue, often with glistening points to some of the feathers and the bill is either yellow or black. One species, however (*M. castaneus*), from Sumatra, has the under parts chestnut. They frequent the deepest recesses of the jungles, usually at some considerable elevation in the mountains, and generally in the neighbourhood of rocky streams. They are extremely shy and therefore very rarely seen, though their clear whistling note is often heard in neighbourhoods frequented by them. One species, *Myiophoneus eugenei*, is quite common in the vicinity of the Batu Caves and occurs also near Taiping. Elsewhere it is found in Burma, Tenasserim, Siam and Yunnan.—HERBERT C. ROBINSON.]

[*From "The Ibis," for April, 1905.*]

ON A NEW SPECIES OF TREE-PARTRIDGE FROM THE MOUNTAINS OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, M.B.O.U.,
Curator of the Selangor State Museum.

WITH NOTES

By W. R. OGILVIE-GRANT.

THIS very distinct and interesting species of Tree-Partridge, of which a brief diagnosis has already been published in the "Bulletin of the British Ornithologists' Club," is not an unexpected addition to the Peninsular fauna. It differs from all described members of the genus, except *Arboricola rubrirostris* of Sumatra, in having the crown of the head black, but from that species it is readily distinguished by the colour of the bill and by many striking differences in the plumage. Its nearest ally is undoubtedly *A. atrigularis*, which ranges from Assam southwards to Upper Burma. The type-specimen has been deposited in the National Collection. A male and female were obtained by my native collectors, who also observed, but did not secure, *Caloperdix oculea* and the recently described *Rheinhardtius ocellatus nigrescens*, Rothsch., as well as a Silver-Pheasant, probably undescribed, which I myself have met with in the same district.

The new species may be fully described as follows:

Arboricola campbelli.

Arboricola campbelli, Robinson, Bull. B. O. C. xv. p. 28 (1904).

Adult Male.—Top of the head, nape, lores, and periocular region jet-black; a broad white supra-loral stripe ending immediately above the eye, the feathers with black shaft-stripes; a white stripe from the base of the lower mandible, broadening posteriorly until it reaches the ear-coverts, which are greyish black. Sides of the neck black; a somewhat ill-defined black-and-white stripe from each side of the occiput to the nape, the bases and margins of the feathers being white. Chin and upper throat black; feathers of the lower throat with their bases white, forming an ill-defined collar. Chest and upper abdomen dark grey; lower abdomen paler, whitish in the middle with a brownish tinge; flank-feathers greyish, shading into olive-brown near the extremity, with a subterminal rufous-buff shaft-spot and a terminal black band: concealed patch of downy feathers under the wing grey. Feathers of the thighs greyish olive, obscurely barred with orange-buff and tipped with black; under tail-coverts with their bases black, their tips greyish olive; mantle, back, and upper tail-coverts golden olive-brown, each feather with three narrow bars of black: tail-feathers above blackish, vermiculated with olive-brown, beneath greyish olive. Primaries brownish black: outer primary-coverts and secondaries black, their outer webs broadly margined with chestnut; remaining wing-coverts greyish olive, their concealed portions black. Tertiaries and scapularies greyish olive, with a broad oblique subterminal bar of black and a terminal one of chestnut. Quill-lining greyish, the inner wing-coverts whitish, grey at the base, the outer series sooty black:

axillaries greyish white. Iris brown; bill black; gular and orbital skin brick-red; tarsi and claws bright sealing-wax red. Total length 246 mm., wing 143, tail 61, tarsus 43, culmen 21.

Adult Female.—Similar to the male. Total length 223 mm., wing 137, tail 61, tarsus 41, culmen 19.

Habitat.—Telom Valley (3,500′–4,500′), borders of Perak and Pahang, Malay Peninsula.

Since the publication of the twenty-second volume of the "Catalogue of Birds" in 1893 several new species of Tree-Partridge have been described, and Mr. W. R. Ogilvie-Grant has kindly supplied me with the following amended key to the known species of *Arboricola* including *Tropicoperdix*:

A. Concealed patch of downy feathers under the wing grey. (Arboricola.)

- a. Feathers of the sides and flanks grey or grey edged with chestnut, usually with a white spot or shaft-stripe on each.
  - a′. Upper back olive-brown, barred and fringed with black.
    - a″. Top of the head bright chestnut; chin and throat black, in some specimens each feather narrowly margined with white ... *torqueola, male.*
    - b″. Top of the head brownish or olive-brown, each feather tipped with black.
      - a‴. Chin, throat, and front of neck rufous, the two latter spotted all over with black, or sometimes on the sides only ... ... *torqueola, female.*
      - b‴. Chin and throat black; front of neck black, each feather edged with white ... ... *atrigularis, male, female.*
      - c‴. Chin and throat black; front of neck orange-scarlet ... *ardens, male, female.*
      - d‴. Chin, upper part of throat, and front of neck white; lower part of throat black *crudigularis, male, female.*
  - b′. Upper back uniform olive-brown, not barred with black; some of the feathers sometimes slightly fringed with black at their extremities.
    - c″. Chest grey; top of the head olive-brown, each feather edged with blackish brown.

e'''. Front of the neck bright rufous.

a^4. Chin and throat black ... *intermedia, male, female.*

b^4. Chin and throat rufous, thickly spotted with black *rufogularis, male, female.*

f'''. Front of neck black, separated from the breast by a narrower white and a wider dark chestnut band.

c^4. Forehead dark, like the crown ... ... *gingica.*

d^4. Forehead white ... ... *ricketti, male, female.*

d''. Chest and top of head chestnut; chin and throat bright rufous; front of neck white, divided from the chest by a narrow black band ... ... *mandellii, male, female.*

b. Feathers of the sides and flanks grey, shading into olive-brown near the extremity, with a subterminal rufous-buff spot and a black terminal band ... ... *campbelli, male, female.*

c. Feathers of the sides and flanks uniform chestnut ... ... *javanica, male, female.*

d. Feathers of the sides and flanks black with narrow wide-set white bars ... ... *rubrirostris, male, female.*

e. Feathers of the sides and flanks each with a large subterminal white spot partially or wholly bordered with black.

c'. Chest brownish red, brownish ochre, or olive-brown; scapulars chestnut at the extremity.

e''. Wide superciliary stripe pale buff, extending down the sides of the neck ... ... *brunneipectus, male, female.*

f''. Superciliary stripe absent ... *henrici, male, female.*

d'. Chest bright rust-red or reddish chestnut; scapulars olive-brown at the extremity.

g''. Superciliary stripe grey ... *hyperythra.*

h''. Superciliary stripe rust-red ... *erythrophrys, male, female.*

f. Feathers of the sides and flanks greyish, widely barred with white and black at the extremity.

e'. Feathers of the back dark earthy-brown faintly margined with blackish ... ... *orientalis.*

f'. Feathers of the back golden-brown fringed and barred with black ... *sumatrana.*

B. Concealed patch of downy feathers under the wing snow-white. (TROPICOPERDIX.)

g. Sides and flanks marked and mottled with black and buff; chest olive-brown with wavy bars of black ... *chloropus, male, female.*

h. Sides and flanks barred with black and buff; upper half of chest chestnut ... ... *charltoni, male, female.*

Mr. Ogilvie-Grant has also furnished me with the following remarks upon two of the recently discovered species:

(1) ARBORICOLA RICKETTI.

Arboricola ricketti, Grant, Bull. B. O. C. viii. p. xlviii (1899).

Thanks to the generosity of Mr. C. B. Rickett, there is now a series of this fine species in the National Collection. All of the examples have the white forehead and superciliary stripe well developed, and in this respect differ from the nearly allied *A. gingica*, Temm., the type of which is preserved in the Leyden Museum.

HABITAT.—Foh-kien, China.

(2) ARBORICOLA HENRICI.

Arboricola henrici, Oustalet, Bull. Mus. Paris, ii. p. 317 (1896); *id.* Arch. Mus. Paris, (4) i. pl. ix. (1899).

This species appears to be closely allied to *A. brunneipectus*, Tick. In describing the type M. Oustalet compares it with *A. torqueola*, but it evidently belongs to quite a different section of the genus, having the feathers of the sides and flanks ornamented with a large subterminal white spot and terminal black band, as in *A. brunneipectus*. From the latter species it appears to differ only in having the forehead chestnut instead of whitish buff and in lacking the pale buff superciliary stripes. In the description the wings are said to resemble those of *A. torqueola*, but the figure (*op. cit.*) represents the wing-coverts as being pale blue tipped with chestnut and with a subterminal black spot. If the figure correctly represents the colouring of this bird's wing, it is unlike that of any other member of the genus.

HABITAT.—Tonkin and Annam.

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NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

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IN

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FEDERATED MALAY STATES.

LIST

OF

TAMIL PROPER NAMES.

COMPILED BY

A. V. BROWN,

(Federated Malay States Civil Service).

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PRICE FIFTY CENTS.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE, KUALA LUMPUR.

ON A COLLECTION OF *LONGICORN COLEOPTERA* FROM SELANGOR AND PERAK.

By CHARLES J. GAHAN, M.A.

IN giving the results of my work on this small but interesting collection of Longicorn beetles, I have thought it well to prefix a complete list of the species contained in it, since many of these species had not previously been recorded from the Malay Peninsula. This list is followed by descriptions of those species which I consider to be new, and remarks on such others as seemed to call for them. I have added also the descriptions of one or two species collected by the late Mr. W. Doherty in Perak, or by Mr. Robinson himself in the Siamese Malay States. The collection of Longicorn beetles made by Doherty in Perak was a pretty considerable one, and several new species in it yet remain to be described.

I.—LIST OF THE SPECIES.

CERAMBYCIDÆ.

Æolesthes holosericea, Fabr. ...	South Perak:	Batang Padang, 1,000-2,500′
Pachyteria equestris, Newm. ...	Selangor:	Rantau Panjang
Chloridolum cinnyris, Pasc. ...	,,	Bukit Kutu, 3,500′
Chloridolum thomsoni, Pasc. ...	,,	,, ,,
Prothema humeralis, Pasc. ...	,,	Dusun Tua
Xylotrechus affinis, Gahan, *sp. nov.*	,,	Bukit Kutu, 3,500′
Xylotrechus discors, Gahan. ...	,,	,, ,,
Xylotrechus gestroi, Gahan. ...	,,	,, ,,
Chlorophorus annularis, Fabr. ...	,,	Semangko Pass and South Perak: Batang Padang Valley
Chlorophorus sumatrensis, Lap. & Gory.	,,	Dusun Tua
Arcyphorus histrio, Chevr. ...	,,	,,
Arcyphorus conformis, Gahan, *sp. nov.*	,,	,,
Psilomerus gracilis, Gahan, *sp. nov.*	,,	,,
Demonax cumulosus, Pasc. ...	,,	Bukit Kutu, 3,500′
Demonax ventralis, Gahan, *sp. nov.*	,,	Batu Tiga, near Kuala Lumpur
Polyphida modesta, Gahan, *sp. nov.*	,,	Bukut Kutu, 3,500′
Mimistena biplagiata, Gahan, *sp. nov.*	,,	Dusun Tua
Typodryas chalybeatus, Pasc. ...	,,	Bukut Kutu, 3,500′
Noëmia flavicornis, Pasc. ...	,,	,, ,,

LAMIIDÆ.

Obages palparis, Pasc. ...	Selangor:	Bukit Kutu, 3,500′
Epicedia maculatrix, Perty. ...	South Perak:	Batang Padang Valley
Leprodera equestris, Pasc.	,,	,, ,,

Leprodera fimbriata, Chevr. ...	Selangor: Batu Tiga near Kuala Lumpur
Leprodera epicedioides, Pasc. ...	,, Bukut Kutu, 3,500′
Anhammus conspersus, Thoms. ...	,, Rantau Panjang
Epepeotes luscus, Fabr.	,, Bukit Kutu, 3,500′
Epepeotes vestigialis, Pasc. ...	South Perak: Batang Padang Valley
Macrochenus melanospilus, Gahan, *sp. nov.*	Selangor: Bukit Kutu, 3,500′
Gnoma subfasciata, Thoms. ...	,, ,, ,,
Sarathrocera lowei, White ...	,, Kuala Lumpur, 1,900′
Monohammus serratus, Gahan, *sp. nov.*	Perak
Haplohammus granulatus, Gahan, *sp. nov.*	Selangor: Bukit Kutu, 3,000′
Haplohommus fistulator, Germ. ...	Pulau Rumpia, Sembilan Ids., off the mouth of Perak River
Orsidis dispar, Pasc.	Selangor: Bukit Kutu, 3,500′
Amechana nobilis, Thoms. ...	,, ,, ,,
Combe brianus, White	,, Rantau Panjang
Cycos subgemmatus, Thoms. ...	,, Bukit Kutu, 3,500′
Pharsalia ferruginea, Gahan, *sp. nov.*	,, ,, ,,
Pharsalia supposita, Pasc. ...	,, ,, ,,
Syrrhopens substrigosa Pasc. ...	,, ,, ,,
Anancylus basalis, Gahan, *sp. nov.*	,, ,, ,,
Demodes vittata, Gahan, *sp. nov.*...	,, ,, ,,
Atossa spilota, Gahan, *sp. nov.* ...	,, ,, ,,
Grammœchus polygrammus, Thoms.	,, ,, ,,
Chœromorpha robinsoni, Gahan, *sp. nov.*	,, ,, ,,
Iphiothe criopsioides, Pasc. ...	,, ,, ,,
Pterolophia subtincta, Pasc. ...	,, ,, and Semangko
Pterolophia robinsoni, Gahan, *sp. nov.*	
Sthenias franciscanus, Thoms. ...	,, Bukit Kutu, 3,500′
Dystasia affinis, Gahan	,, ,, ,,
Nicomia castelnaudi, Thoms. ...	,, ,, ,,
Cyphoscyla lacordairei, Thoms. ...	,, ,, ,,
Thysia wallichi, Hope	,, Semangko Pass
Glenea hebe, Thoms.	,, Bukit Kutu, 3,500′
Glenea voluptuosa, Thoms. ...	,, Rantau Panjang
Glenea honora, Pasc.	,, ,,
Glenea funerula, Thoms.	,, Semangko Pass
Glenea tenuilineata, Thoms. ...	,, Bukit Kutu, 3,500′
Glenea obsoletepunctata, Thoms....	,, ,, ,,
Glenea elate, Pasc.	,, ,, ,,
Glenea robinsoni, Gahan, *sp. nov.*	,, ,, ,,
Glenea virgata, Gahan, *sp. nov.* ...	,, ,, ,,
Glenea saperdoides, Thoms. ...	,, ,, ,,
Glenea citrina, Thoms.	,, ,, ,,
Oberea limbata, Pasc.	,, ,, ,,
Astathes terminata, Pasc. ...	,, ,, ,,

II.—DESCRIPTIONS OF NEW SPECIES AND REMARKS ON SOME SPECIES PREVIOUSLY DESCRIBED.

XYLOTRECHUS CONSOCIUS, *sp. nov.*

(Pl. VI. Fig. 3.)

Black or dark-brown; with grey pubescence covering the head and most of the prothorax and forming bands on the elytra; body underneath covered with ashy-white pubescence except over the middle of the metasternum and the epimera of the mesosternum, these parts being dark-brown. Front of head constricted between the eyes; furnished with four carinæ, the two intermediate ones united below and divergent above; vertex with a single median very fine carina, which sometimes is obsolete. Prothorax slightly longer than its greatest width, the disc finely asperate, and having three nude black or dark-brown spots, one near the base and one at each side of the middle, the basal spot sometimes being prolonged anteriorly to form a median band. The grey bands are usually disposed as shown in the figure, but the anterior sutural band is often widened out to a greater extent behind becoming more triangular, and the post-median triangular band occasionally spreads out anteriorly so as almost to reach up to the band in front of it.

This species appears to be most nearly allied to *X. pedestris*, Pasc., which greatly resembles it in colour, but differs in the direction taken by the anterior bands on the elytra.

Length 9.15, breadth 2.4 millim.

HABITAT.—Perak (*Doherty*), Penang (*Lamb*); and Bukit Besar in the Siamese Malay States (*Annandale* and *Robinson*).

XYLOTRECHUS AFFINIS, *sp. nov.*

(Pl. VI. Fig. 1.)

Black; head and prothorax covered with grey pubescence, the prothorax having, however, a nude round spot on each side of the disc; elytra with four bands of ashy-grey pubescence disposed as shown in the figure; body underneath covered with ashy-grey pubescence, the episterna of both the meso- and metathorax being more densely covered with whitish pubescence; legs black, with a faint grey pubescence: antennæ reaching a little past the middle of the elytra, the proximal six joints black, veiled with grey pubescence, the remaining joints pale fulvous. Front of head parallel-sided, not constricted between the eyes, furnished with three feeble carinæ, one median, the others midway between this and the lateral borders. Prothorax distinctly longer than broad, very slightly rounded at the sides, and rather finely asperate on the disc.

This species resembles *X. fluctuosus*, Pasc. (*Perissus*), but is relatively somewhat longer and narrower, with the prothorax less rounded at the sides. In the latter species the second grey band of the elytra has a straight hind border, and the third band is dilated posteriorly as well as anteriorly at the suture.

Length 9, breadth 2 millim.

HABITAT.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

XYLOTRECHUS DISCORS, GAHAN.

(Pl. VI. Fig. 2.)

One slightly damaged specimen of this species (the description of which, based chiefly on Sumatran specimens, appears in vol. xlii. of the Ann. Mus. Civ. Genova) was obtained by Mr. Robinson at Bukit Kutu in Selangor. The pubescence in this specimen, which is the one figured here, differs slightly in colour from that of the specimens from Sumatra, being of a greenish-grey instead of a leaden-grey or ashy-grey tint. The species is very nearly allied to the preceding one, and it is quite possible that with a large series of specimens for examination, the two forms may be shown to belong to one very variable species.

ARCYPHORUS CONFORMIS, *sp. nov.*

(Pl. VI. Fig. 5.)

FEMALE.—Head and prothorax black, rather faintly covered with grey pubescence, a large oval spot on the disc of the prothorax and a rounded spot on each side being quite bare of pubescence; elytra dark-brown, with bands of grey pubescence arranged as follows: a narrow transverse band at the base, from each end of which a short longitudinal band runs back, a short sutural band between these two, a slightly arcuate transverse band crossing the whole width of the elytra at about one-third of their length from the base, a triangular band with its base a little way behind the middle and its apex touching the transverse band in front, a large oblong spot at the apex; body underneath grey, with a pale-yellow band at each side of the metathorax and pale-yellow spots along each side of the abdomen. Prothorax entirely covered with shallow punctures, the edges of which form a fine reticulation. Middle femora carinate on each side near the ventral border. First joint of the hind tarsus a trifle longer than the remaining joints together.

Length 9.5 millim.

HABITAT.—Selangor: Dusun Tua (*H. C. Robinson*).

PSILOMERUS GRACILIS, *sp. nov.*

(Pl. VI. Fig. 4.)

Head and prothorax black, the head sparsely covered with ashy-white pubescence, a similar pubescence covering the prothorax at the base and on the lower part of each side; elytra dark-brown, with a testaceous spot on each near the base, the sides bare of pubescence, and the disc covered, in the form of a broad band extending its whole length, with a not very dense ashy-white pubescence; legs and antennæ dark-brown; body underneath black, covered with ashy-grey pubescence. Third joint of the antennæ scarcely more than one-third of the length of the fourth joint, armed at the apex with a long slender spine, which has a slightly thickened and rather blunt extremity. Prothorax and elytra finely and very densely punctate.

This species differs from *P. angustus*, Chevr., in having a black head and thorax, and the elytra covered above with a single broad longitudinal band of ashy-white pubescence; the third joint of the antennæ is relatively even shorter than in *P. angustus*, where it is nearly half the length of the fourth.

Length 7, breadth 1.5 millim.

HABITAT.—Selangor: Dusun Tua (*H. C. Robinson*).

DEMONAX VENTRALIS, *sp. nov.*

Black; the head and prothorax covered with grey pubescence, but with two spots or a transverse band on the disc of the prothorax, dark-brown or black: elytra with four transverse ashy-grey bands, the first, which is at the extreme base, being united with the second by means of a short sutural band: body underneath ashy-grey, with the last three segments brownish-black. Antennæ not quite so long as the body in the male, and somewhat shorter in the female; black faintly veiled with grey pubescence, the eighth and ninth joints usually being testaceous or fulvous; third and fourth joints furnished each with a rather long spine at the apex, the fourth shorter than the third. Prothorax ovate-cylindrical. First joint of the hind tarsus twice as long as the remaining joints together.

This species is extremely like *D. tipularius*, Pasc., in form, colour and markings, presenting a difference, however, in the colour of the abdomen, the first two segments being ashy-grey in sharp contrast with the dark-brown of the last three segments. The chief difference is in the length of the antennæ, these being one-third longer than the body in the male of *tipularius* and a little longer than the body in the female.

Length 8–10 millim.

HABITAT.—Perak (*Doherty*); Selangor: Kuala Lumpur (*H. C. Robinson*), and Borneo (*Wallace*).

POLYPHIDA MODESTA, *sp. nov.*

(Pl. VI. Fig. 6.)

Head and prothorax black, with a rather dense covering of silver-grey pubescence; prothorax with a very narrow glabrous-black band along the middle not quite reaching to the base or apex; elytra metallic-green, becoming steel-blue in places, rather faintly covered with grey pubescence, but having each a denser band of golden or silvery pubescence extending from the base along the middle of the disc up to or beyond the middle; body underneath brownish or black, rather densely covered with silver-grey pubescence; legs brownish-black, faintly veiled with grey pubescence, the middle and hind femora testaceous at the base. Antennæ black or dark-brown, with the seventh and eighth joints, to a greater or less extent, and some of the other joints, at the base, testaceous. Vertex of head and sides of prothorax marked with a few sparse punctures. Elytra strongly, but not very densely, punctured in more or less definite longitudinal rows.

This species is allied to *P. feæ*, Gahan, from Burma, but differs from it and from other species of the genus in having no transverse bands or spots on the elytra, each of these showing only a single longitudinal band of golden pubescence.

Length 9–11.5 millim.

HABITAT.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), Perak (*Doherty*), and Borneo: Kuching (*Shelford*).

MIMISTENA BIPLAGIATA, *sp. nov.*

(Pl. VI. Fig. 7.)

FEMALE.—Black and glossy: the elytra slightly tinged with metallic-green; and marked each with an elongate spot of a yellowish-white

colour between the middle and the base. Head sparsely covered with ashy-grey pubescence in front; rugulose-punctate above. Antennæ a little longer than the body, dark-brown, with the eighth and ninth joints and basal half of the tenth fulvous. Prothorax strongly but sparsely punctured; furnished at the edge of the disc on each side with an oblique tubercle; marked with a narrow transverse band of silver-grey pubescence near the base and another, interrupted in the middle, on the constructed part near the apex. Scutellum covered densely with white pubescence. Elytra sparsely punctured and slightly rugulose alongside the suture, almost impunctate elsewhere; each sub-acute, but not spined nor toothed, at the apex. Body underneath glossy-black; with transverse bands of silver-white pubescence at the sides of the abdomen, and a curved or oblique band on the hind breast; the prosternum and mesosternum being less densely covered with greyish-white pubescence. Legs brownish-black, with the clubs of the femora reddish-brown; first joint of hind tarsus longer than the remaining joints together.

Length 7.3 millim.

Habitat.—Selangor: Dusun Tua (*H. C. Robinson*).

This species differs from *M. femorata*, Pasc., in having the elytra less strongly and less thickly punctured alongside the suture, unarmed at the apex, and marked each with a yellowish-white spot in front of the middle.

ANHAMMUS CONSPERSUS, Thoms.

One example of this species was obtained by Mr. Robinson at Rantau Panjang in Selangor, another at Nawngchik: Bukit Besar in the Siamese Malay States. The species was taken in Perak by Mr. Doherty, and occurs also in Java and Sumatra.

Nephelotus licheneus, Pasc.—a species from Borneo, and the type of the genus *Nephelotus*, Pasc.—is hardly distinct from *A. conspersus*, Thoms. *Nephelotus* may conveniently be retained as a sub-genus of *Anhammus* to include *A. marcipor*, Newm., and *A. conspersus*, Thoms., together with the local form *A. licheneus*, Pasc.

MACROCHENUS MELANOSPILUS, *sp. nov.*

(Pl. VI. Fig. 8.)

Black; head and prothorax faintly covered above with grey pubescence and marked each with three longitudinal white bands; scutellum ashy-white: elytra clothed with ashy-white pubescence interrupted by numerous black spots which are irregularly disposed and somewhat variable in size; head with the front, except in the middle, and the cheeks covered with whitish pubescence; prothorax with a rather broad white band along each side; the sides of the breast and abdomen covered with white pubescence enclosing black spots. Prothorax of the male nearly twice as long as its width across the base, that of the female being scarcely or not at all longer than its width at the base.

Length 22–31 millim.

Habitat.—Bukit Kutu in Selangor (*H. C. Robinson*), Perak (*Doherty*), Penang (*Lamb*), and Mt. Kina Balu in North Borneo (*Whitehead*).

This species agrees closely in structural characters with others of the genus, and is chiefly distinguishable by the form and disposition of the black spots on the elytra: these spots are irregular in size and shape, some smaller and some larger, with a tendency to coalesce in places. In the male specimen from Selangor which is figured the black spots are somewhat smaller than usual. Pascoe wrongly identified the species as *Mecotagus tigrinus*, Oliv., and under that name has recorded it from Penang (Proc. Zool. Soc., 1866, p. 253). In *M. tigrinus*, which is a Ceylonese species, the black spots of the elytra are less numerous, larger in size and more or less oblong in shape; and the median white band on the pronotum is usually much narrower than either of the other two.

MONOHAMMUS SERRATUS, (Pasc. in litt.) *sp. nov.*

(Pl. VI. Fig. 9.)

Black; densely covered above with a fuliginous brown tomentum, which becomes somewhat greyish on the disc of the elytra; the latter marked each with two large irregular, velvety-black spots one just before and the other a little way behind the middle. Head finely and somewhat densely punctate; eyes rather small, the lower lobes not extending more than half-way down the cheeks. Antennæ from twice to twice and a half as long as the body in the male, barely longer than the body in the female. Prothorax finely and rather thickly punctate, the disc with three small feebly raised tubercles. Scutellum fulvous at the sides, black in the middle. Elytra sparsely punctured above and densely and rather strongly at the sides, especially in the anterior half; each furnished with three or four rows of small tubercles, one row extending from the base about half-way to the middle along the middle of the disc, the others placed close to, and on the side, and extending quite up to or beyond the middle, with large deep punctures alternating with the tubercles in each row. The presence of these tubercles, causing the elytra to appear somewhat serrated on each side, is very characteristic of the species and distinguishes it from all others included in the genus.

Length 15–20 millim.

Habitat.—Penang (*Lamb*), Perak (*Doherty*), and Nawngchik: Bukit Besar, 2,500 ft. (*H. C. Robinson*).

HAPLOHAMMUS GRANULATUS, *sp. nov.*

(Pl. VI. Fig. 10.)

Female.—Reddish-brown; the head clothed on top, at the sides and over patches in front, with pale fulvous pubescence; the prothorax covered with brown pubescence mixed with patches of pale fulvous; scutellum fulvous; elytra covered with brown pubescence varied with patches of an ashy-grey colour; body underneath covered with greyish or tawny-grey pubescence; legs grey, the femora having each a dark-brown band at the middle, and the tibiæ being more or less brown towards the apex. Head distinctly, but rather sparsely punctured; eyes moderately large, the lower lobes extending downwards more than half-way towards the genal edge. Antennæ one-third longer than the body, pale grey, with the apical half of the third and following joints dark-brown; first joint subcylindrical, the apical cicatrix narrow and indistinct, being covered by pubescence, and its presence indicated

only by the limiting carina. Prothorax distinctly but not densely punctured. Elytra sparsely punctured posteriorly and somewhat more densely near the base especially on the sides; some of these punctures forming rows which, setting out near the shoulders, approach nearer to the suture as they pass backwards, while at the front edge of each puncture there is a rounded polished granule, these granules becoming gradually smaller as they recede from the base; each elytron slightly truncate at the apex, but not angulated.

Length 16, breadth 5 millim.

Habitat.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*).

PHARSALIA FERRUGINEA, *sp. nov.*

(Pl. VI. Fig. 11.)

Black; covered for the most part with pubescence of a rust-red colour, which is varied on the elytra with velvety-black patches, and with a yellowish-white band crossing each a little before the middle from the outer margin almost up to the suture; body underneath with rust-red pubescence changing in part to grey, the abdomen with a row of large transverse glabrous black spots along the middle, and a row of smaller quadrate spots on each side; legs covered entirely with rust-brown pubescence through which short white setæ are scattered. Antenniferous tubercles contiguous or very nearly so; antennæ of the male three to four times as long as the body. Elytra rounded at the apex, furnished each with a basal tubercle, the front face of which rises almost perpendicularly from the basal margin.

This species is closely allied to *P. pulchra*, Gahan, and somewhat resembles it in markings, but is distinguishable from it at once by the ferruginous red colour of most of the pubescence covering it, the corresponding pubescence in *P. pulchra* being of an ashy-grey colour.

Length, 14–20 millim.

Habitat.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*); Nawngchik in the Siamese Malay States (*Annandale and Robinson*).

ANANCYLUS BASALIS, *sp. nov.*

(Pl. VI. Fig. 12.)

Black; densely covered with pubescence of a prevailing fulvous grey or greenish-grey tint varied with darker-brown spots and bands. Antennæ with the first joint greenish grey, tipped with dark-brown at the apex, the third and following joints brownish-black, narrowly ringed with ashy-grey at the base; prothorax marked above with four small more or less distinct dark-brown spots—two in front and two, more widely separated, near the base; scutellum grey in the middle, dark-brown at the sides; elytra with a dark-brown angulated band crossing them between the middle and the base, and several less distinctly limited dark-brown spots scattered over the posterior two-thirds. Body underneath covered with grey pubescence along the middle and fulvous grey pubescence at the sides; legs grey, the femora ringed with blackish-brown near the apex, the tibial at the apex, and an outer spot on each near the base blackish-brown; first two joints of the tarsi ashy-white above, the others black. Elytra distinctly but not very densely punctured; each with a short narrow dorsal ridge or crest

extending about one-third of its length from the base and furnished along the top with small, shining, black granules. The presence of this ridge constitutes a distinctive character since all the other known species of the genus have, instead of a narrow ridge, a rather broad obtuse swelling near the base of each elytron.

Length, 10–13 millim.

HABITAT.—Perak (*Doherty*), and Bukit Kutu in Selangor (*H. C. Robinson*).

* CHŒROMORPHA ROBINSONI, *sp. nov.*

(Pl. VI. Fig. 15.)

FEMALE.—Densely covered with brownish-red pubescence varied with dark-brown spots and bands. Head distinctly but sparsely punctured in front, marked with two dark-brown bands extending along the front and vertex, and with a short band or spot behind the upper lobe of each eye; prothorax with some small dark-brown spots above and a larger one on the anterior part of each side; elytra with a very dark brown, slightly curved, band crossing them between the middle and the base and becoming slightly narrower as it approaches the suture, and with a zig-zag band of the same colour a little way behind the middle, marked also with a few dark-brown spots, of which the most conspicuous are two on each elytron a little before the apex; body underneath covered for the most part with reddish pubescence, the last ventral segment and a large spot on the fore-part of each of the metathoracic episterna being dark-brown; legs reddish, with the apices of the tibiæ and the first two joints of the tarsi, black; front tibiæ with a distinct brush of black hairs along the distal third of the outer face. Antennae about as long as the body, with the third joint almost equal in length to the first and a little longer than the fourth. Prothorax with a small but distinct tubercle on each side near the front border. Elytra strongly but very sparsely punctured, each carinate near the suture, the carina beginning a little before the middle and ending a little in front of the apex.

This species strongly resembles *Chœromorpha balteata*, Pasc. (*Agelasta*), in colour and markings, but is easily distinguishable from it by the presence of the anterior tubercle at each side of the prothorax, and in having the third joint of the antennae longer than the fourth. In *balteata* the tarsi are entirely black, and the front tibiæ without a brush of hairs.

Length 12, breadth 5 millim.

HABITAT.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*).

DEMODES VITTATA, *sp. nov.*

(Pl. VI. Fig. 14.)

FEMALE.—Rather densely covered with fulvous-brown pubescence, varied with bands and a few small spots of a luteous-white colour. Prothorax with four dorsal bands, the two intermediate ones being in

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* Chœromorpha, *Chevr. in D'Orbigny's Dict. Univ. d'Hist. Nat. III.* p. 613 (1849). This genus, briefly characterised by Chevrolat, will include most of the species placed under *Agelasta* in the catalogue of Gemminger and Harold. The characters given by Lacordaire for the genus *Agelasta* apply to the genus *Chœromorpha*, Chev., but not to the type of *Agelasta*.

line with two short bands on the vertex of the head; elytra each with a marginal and dorsal band, an interrupted line of small spots near the suture and a few spots scattered elswhere. Body underneath pubescent like the upper side, the sides of the prothorax in their lower part, the side pieces of the mesosternum, and two narrow bands at each side of the metasternum, being luteous white; legs fulvous-grey, with the tarsi dark-brown. Antennæ about equal in length to the body; fourth joint slightly thickened, dark-brown in colour, the other joints greyish-tawny or brown. Prothorax feebly and very sparsely punctate, the elytra a little more strongly and less sparsely punctured.

Length 14, breadth 5 millim.

HABITAT.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

The genus *Demodes*, Newm., is omitted from Lacordaire's "Genera," and is wrongly placed near *Navomorpha* in the catalogue of Gemminger and von Harold. It belongs to the group *Mesosinæ*, and is nearly allied to *Phemone*, Pasc. *Grammœchus*, Thoms, and *Atossa*, Thoms., two genera for which Lacordaire formed a special group—the *Atossides*, are also closely related to it, differing only in having the head narrower and more concave between the antennæ, and the scape of the antennæ usually destitute of an apical cicatrix or carina. The cicatrix is, however, present, though very small and ill-defined, in *Atossa atomaria*, Pasc., and in one or two other species.

ATOSSA SPILOTA, *sp. nov.*

(Pl. VI. Fig. 13.)

Head, prothorax, body underneath and legs densely covered with greyish pubescence of a somewhat dark shade, becoming lighter in places, notably on the front and sides of the head, and the outer borders of the tibiæ; head and prothorax marked with two diverging white bands beginning between the antennal supports and extending to the base of the pronotum, whence each is continued as a short band passing obliquely above the shoulder of the elytron; elytra covered less densely with brown pubescence, thickly dotted with small irregular white spots from the base to a little past the middle, this dotted area being limited behind by a narrow broken white band or line of spots; each elytron marked also with a strongly oblique and slightly curved white band between the middle and the apex, with some scattered white specks behind the band, and some, forming longitudinal lines, in front of it. Antennæ about equal in length to the body in the female, and longer by the last three or four joints in the male; first joint dark-brown underneath pale-grey above; second and third and base of fourth pale-grey, the rest of the fourth which is slightly-thickened, being of a brownish-black colour; fifth grey at base, dark-brown at apex, remaining joints reddish-brown. Prothorax slightly rugose and very sparsely punctate. Elytra strongly but not very densely punctate over the whole of the anterior spotted area, and less strongly and more sparsely behind it.

Length 11–12, breadth 3–5 millim.

HABITAT.—Perak (*Doherty*); Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

This species closely resembles *Atossa ligata*, Pasc. (Grammœchus), in markings and differs very little from it in structure. In *ligata* the

general tint of the upperside is rather brown than grey, the dorsal bands of the head and prothorax diverge less widely behind and are continued to a greater extent along the elytra; the prothorax has on each side a white band which is continued along the side of the meso- and meta-sternum, the presence of this band serving at once to distinguish *ligata* from the present species.

IPHIOTHE CRIOPSIOIDES, Pasc.

This species was described originally from a specimen from Borneo. Mr. Robinson obtained a specimen at Bukit Kutu in Selangor, and the species has also been taken by Doherty at Merang in Sumatra.

PTEROLOPHIA ROBINSONI, *sp. nov.*

Brownish-black, rather densely covered with fulvous-brown pubescence; vertex of head and disc of prothorax marked with three narrow longitudinal bands of greyish or fulvous-grey pubescence, the middle band of the prothorax narrower than the other two and separated from each by a narrow dark-brown band; elytra more distinctly brown over a broad oblique plaga on each side; marked with a few small whitish or fulvous spots placed transversely near the top of the posterior declivity. Head sparsely punctate. Prothorax rather densely punctate. Elytra densely and strongly punctate and somewhat granulate near the base, more finely and sparsely punctate posteriorly; each with a very distinct tubercle on the disc a little behind the base, and a carina beginning near the middle and extending on to the upper part of the strong posterior declivity; external to the carina are one or two slightly raised lines. Antennæ of the male not longer than the body; the last six joints ringed with grey at the base. This species is allied to *P. camura*, Newm. (=*posticalis*, Pasc.) which it much resembles in form.

Length 8–12 millim.

Habitat.—Perak (*Doherty*); Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), and Nawngchik: Bukit Besar (*Annandale* and *Robinson*).

PTEROLOPHIA SUBTINCTA, Pasc.

Praonetha subtincta, Pasc., Tr. Ent. Soc., Lond. (3) iii. p. 170.

To this species I refer, with doubt, three specimens collected by Mr. Robinson in Selangor, two at Bukit Kutu the third at Semangko. They agree with the type from Java in being covered for the most part with a rust-red pubescence, in having each of the small basal tubercles of the elytra capped with a short tuft of blackish hairs, with other still smaller tufts of black hairs scattered over the middle and posterior parts of the elytra. In two of the specimens there are, as in the type, two vaguely limited ashy-white bands crossing the elytra—a broader one before, and a narrower one behind, the middle; but in addition there is a third narrow zig-zag band of the same colour, nearer to the apex, while the sides of the breast also are more or less ashy-white. The third specimen is almost entirely of a rusty-red colour. The species appears to be nearly allied to *P. melanura*, Pasc. (=*P. montana*, Pasc. =*P. quadraticollis*, Pasc.) resembling it in form and puncturation, but differing by the presence of the small scattered tufts of hair on the elytra, and in not having the last ventral segment black. In one respect Pascoe's description of the species is quite mis-

leading. The prothorax is described as "very transverse and remarkable for the angular emargination of the anterior border." Though this, unfortunately, is true of the type specimen described, it is not true of the species. The type is a specimen which obviously had been injured and in which the prothorax had not properly developed, the pronotum being split down the middle, contracted from before backwards, and pushed out at the sides.

DYSTASIA AFFINIS, Gahan, Ann. Mus. Civ. Gen. xlii. (ined.).

Blackish-brown, covered in part with ashy-grey, in part with tawny and brown, pubescence. Vertex of head, basal joints of antennæ, and six bands along the prothorax, tawny; front of head, sides of prothorax, basal part of elytra, and the body underneath, excepting the abdomen, rather sparsely covered with ashy-grey pubescence; a somewhat ill-defined band of denser ashy-grey pubescence crosses each elytron obliquely just before the middle, the pubescence covering all that part of the elytron which lies behind this band, being mostly of a brownish or tawny-brown colour, mixed here and there with small patches of ashy-grey. Head somewhat rugose punctate in front; prothorax sparsely punctured. Elytra strongly and rather densely punctured, and, near the base, somewhat granulate; each furnished with a small sharp tubercle close to the basal margin, and with a somewhat larger but more obtuse tubercle at a short distance from the base, this tubercle not being tufted with hairs as in most of the other species of the genus. Antennæ of the male not longer than the body, the third and following joints dark-brown at the apex, greyish or fulvous-grey at the base.

Length 12, breadth 5 millim.

Habitat.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), and Sumatra (*Modigliani*).

GLENEA ROBINSONI, *sp. nov.*

(Pl. VI. Fig. 16.)

Female.—Covered above with a deep-black tomentum; the pronotum with a median longitudinal pale-yellow band which widens out somewhat abruptly near the base; scutellum yellowish-white; elytra each with a transverse spot or band at the middle and another at the apex, yellowish-white; body underneath ferruginous-brown, densely covered with luteous-white pubescence, the sides of the prothorax and the sides and greater part of the front of the head being covered with similar white pubescence: legs testaceous-yellow, very faintly pubescent. Antennæ black, longer than the body by about the last two joints; first joint relatively short, finely punctulate, not carinate; third much longer than the first and a little longer than the fourth; elytra acute at the shoulders, bicarinate along each side, with a row of punctures between the carinæ and another between the lower carina and the outer margin; the disc strongly and rather densely punctured from the base up to the median band; apex of each elytron spined at the outer angle, feebly denticulate at the suture.

Length 12, breadth 3.25 millim.

Habitat.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

GLENEA VIRGATA, *sp. nov.*

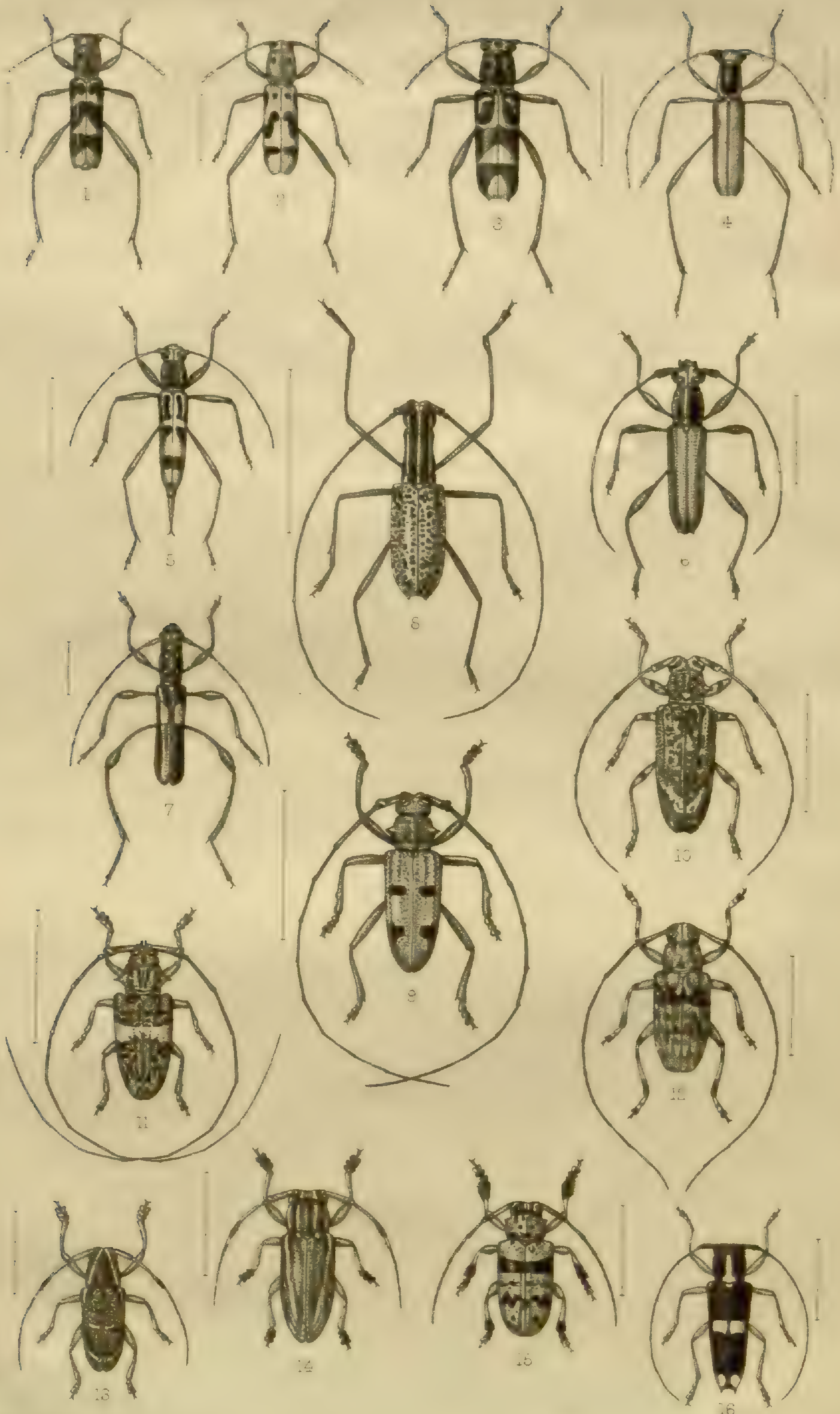
FEMALE.—Black, marked above with ashy-white lines, and almost entirely covered underneath with ashy-white pubescence. Head sparsely punctured, marked with a band of white pubescence on each side of the front, another on each cheek, and two lines on the vertex. Antennæ black, a little longer than the body; third joint much longer than the first or fourth. Prothorax rather thickly punctured, marked above with three narrow bands or lines of bluish-white pubescence; the basal edge, a band on the upper part of each side, and the whole of the lower part, being also bluish-white. Elytra broad in front with the shoulders acute, gradually narrowing posteriorly; the suture, two lines along the disc of each and a short obliquely transverse line just a little before the apex, bluish-white, two lines of the same colour along each side; disc strongly and rather densely but somewhat irregularly punctured, the sides each with two rows of punctures separated by a feeble rather obtuse carina which does not reach base or apex; apex of each elytron armed with a strong outer and shorter sutural spine, the sharp superior lateral carina of the elytron being continued on to the outer spine.

Length 15–17, breadth 4.5–5 millim.

HABITAT.—Perak (*Doherty*), and Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

EXPLANATION OF PLATE.

No.	1.	Xylotrechus affinis, Gahan, *sp. nov.*	(p. 111)
,,	2.	Xylotrechus discors, Gahan, *sp. nov.*	(p. 112)
,,	3.	Xylotrechus consocius, Gahan, *sp. nov.*	(p. 111)
,,	4.	Psilomerus gracilis, Gahan, *sp. nov.*	(p. 112)
,,	5.	Arcyphorus conformis, Gahan, *sp. nov.*	(p. 112)
,,	6.	Polyphida modesta, Gahan, *sp. nov.*	(p. 113)
,,	7.	Mimistena biplagiata, Gahan, *sp. nov.*	(p. 113)
,,	8.	Macrochenus melanospilus, Gahan, *sp. nov.*	(p. 114)
,,	9.	Monohammus serratus, Gahan, *sp. nov.*	(p. 115)
,,	10.	Haplohammus granulatus, Gahan, *sp. nov.*	(p. 115)
,,	11.	Pharsalia ferruginea, Gahan, *sp. nov.*	(p. 116)
,,	12.	Anancylus basalis, Gahan, *sp. nov.*	(p. 116)
,,	13.	Atossa spilota, Gahan, *sp. nov.*	(p. 118)
,,	14.	Demodes vittata, Gahan, *sp. nov.*	(p. 117)
,,	15.	Chœromorpha robinsoni, Gahan, *sp. nov.*	(p. 117)
,,	16.	Glenea robinsoni, Gahan, *sp. nov.*	(p. 120)



ght ad nat. lith. West, Newman imp.

NEW LONGICORNIA FROM SELANGOR.

NOTES ON THE PETROLOGY OF STONE IMPLEMENTS FROM THE FEDERATED MALAY STATES.

By J. B. SCRIVENOR, F.G.S.

1. TEMBELING VALLEY, PAHANG.—A very fine grained siliceous rock with schistose structure well marked by dark, elongated bodies which cannot be determined. The base of the rock is quartz in minute grains. There are also, however, larger, angular fragments of quartz throughout. In the base there has been a large development of biotite in minute flakes. Only a few of these are big enough to give the pleochroism clearly under a one sixth objective.

2. REMBAU, E. 113–05.—Specific gravity 2.75.—A fine grained siliceous rock rendered very dark in section by an abundance of black dust. As in No. 1, biotite is well developed, but after occurs in nests composed of minute flakes of the mica and equally minute grains of quartz. Schistose structure is well marked. The nests of biotite and quartz are elongated along the planes of schistosity.

3. TEMBELING VALLEY, PAHANG.—Specific gravity 2.74.—This again is a very fine grained siliceous rock with larger angular fragments of quartz. The colour of the section is pale chestnut-brown, occasioned by the abundance of biotite in minute flakes. A black dust is distributed irregularly throughout the section, giving it a mottled appearance; and there is also a colourless mineral, apparently isotropic, with a high refractive index, in granules too small for determination.

4. TEMBELING VALLEY, PAHANG.—Specific gravity 2.77.—A fine grained siliceous rock with abundant biotite which is of a dull green colour, probably owing to weathering. It is noteworthy that this alone of all the implements examined shows marked weathering externally. Under a high power a minutely granular mineral with high refractive index is also seen. There is no trace of schistosity.

5. REMBAU, E. 112–05 —A fine grained siliceous rock with angular fragments of quartz in a fine quartzose ground mass. Schistosity is well marked. Biotite in minute flakes is abundant throughout, and one or two small zircons can be seen. Nests of opaque material occur, and associated with one of them is a colourless mineral with high refractive index. It is not sufficiently abundant or in large enough grains to be determined.

6 AND 7. TEMBELING VALLEY, PAHANG.—No. 6 Specific gravity 2.75. No. 7 Specific gravity 2.73.

All these specimens of stone implements are composed of a metamorphosed, fine grained siliceous sediment, characterised by the abundance of biotite in minute flakes. The white appearance of the exterior of No. 4 is due, I believe, to the removal by solution of some of the siliceous material. This results in a pitted, irregular surface that reflects back a great deal of the light that falls on it. The compact, comparatively unweathered interior, on the other hand, presents a smoother surface and absorbs most of the light received.

A SYNOPSIS OF THE BIRDS AT PRESENT KNOWN TO INHABIT THE MALAY PENINSULA, SOUTH OF THE ISTHMUS OF KRA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.,

Curator, Selangor State Museum.

PART II.—THE GALLINACEOUS BIRDS.

I HAVE not considered it necessary to give any definition of the family of Gamebirds, their general appearance needing no description, but have contented myself with supplying a key to the species. It should be noted, however, that the characters employed are purely artificial and arbitrary and that the key will therefore apply only to the species that are found within our limits.

Three forms, *Arboricola campbelli*, *Rheinardius nigrescens*, and *Chalcurus inopinatus* are peculiar to the central mountain masses of the Peninsula, but the remainder have a more or less wide range, either northwards, to Burma and beyond, or through the islands of the Indian Archipelago and Indo-China.

As in the previous section of this paper, species represented in the Perak Museum have an asterisk * attached to their names, while those of which the Selangor Museum possesses specimens are marked with a dagger †.

KEY TO THE SPECIES.

A. With three toes only	*Turnix taigoor*	p. 132
B. With four toes.		
1. Large birds, wing always over 12 inches.		
a. Upper tail-coverts greatly elongated in the male forming a "train"; both sexes crested, the feathers of the crest broadened at the tips	*Pavo muticus*	p. 131
a'. Both sexes with a large crest of hair like white feathers at the back of the head; central pair of tail feathers enormously elongated in the male	*Rheinardius nigrescens*	p. 130
a''. Head not conspicuously crested ...	*Argusianus argus*	p. 131
2. Smaller birds; wing never more than 10 inches.		
b. Tail longer than wing; with metallic ocelli on the plumage.		
c. Sides of the head bare, top of head markedly crested	*Polyplectron malaccensis*	p. 129
c'. Sides of the head feathered, top of head only slightly crested ...	*Chalcurus inopinatus*	p. 130

b'. Tail shorter than wing; without metallic ocelli in the plumage.

d. Wing nine inches or over in the male.

e. Head uncrested, with no wattle or comb.

f. Uniform black in colour ... *Acomus crythrophthalmus, female* p. 128

f'. Tail pale-buff; lower back bronzy-gold ... ... *Acomus crythrophthalmus, male* p. 128

e'. Head uncrested with wattles and comb ... ... *Gallus gallus* p. 129

e''. Head crested with wattles and no comb ... ... *Lophura rufa* p. 129

d'. Wing under eight inches.

g. Crested.

h. Basal half of bill crimson ... *Rollulus roulroul, male* p. 127

h'. Bill uniform black ... ... *Rollulus roulroul, female* p. 127

g'. Not crested.

i. Legs of the male armed with spurs.

j. Bill decidedly elongated ... *Rhizothera longirostris* p. 125

j'. Bill stout and thick ... ... *Caloperdix oculea* p. 126

i'. Legs of the male without spurs.

k. Tail with 14 feathers.

l. Breast dark-grey ... ... *Arboricola campbelli* p. 126

l'. Breast chestnut ... ... *Tropicoperclix charltoni* p. 126

k'. Tail with 10–12 feathers more than half the length of the wing ... ... *Melanoperdix negra* p. 127

k''. Tail with eight feathers very short band soft, concealed the tail coverts by... ... *Excalfactoria chinensis* p. 128

*† 22. *RHIZOTHERA LONGIROSTRIS*—THE LONG-BILLED PARTRIDGE.

Rhizothera longirostris (Temm.); *Ogilvie-Grant, Cat. Birds Brit. Mus.* xxii. p. 183 (1893); *Sharpe, Hand-list of Birds*, i. p. 26 (1899).

Not much is known of the habits of this species though it is common in certain districts throughout the Peninsula, being usually found in hilly, but not mountain, jungle, wherever bamboo is abundant. It is exceedingly shy and rarely takes to flight, trusting rather to its running powers, which are very considerable and to the protection afforded by the tints of its plumage, which harmonize in a wonderful way with the dead leaves etc., of the jungle. Its note is a shrill whistle, harsher and less sustained on one note than that of *Rollulus roulroul*, and is usually heard shortly before or after dusk and dawn,

though occasionally in the middle of the night. The species lends itself readily to domestication and is often captured and tamed by Malays and Sakais and may be seen running with their domestic poultry.

LOCALITIES IN THE PENINSULA.—Perlis (*Cantor*); Perak: New Territory (*Annandale*); Kuala Kangsar (*Kelham*); Larut (*Wray*); Selangor: Serendah (*Robinson*); Kuala Lumpur (*Butler*); Ulu Langat (*Robinson*); Klang (*Davison*); Pahang: Gunong Tahan (*Waterstradt*); Malacca (*Maingay, Davison*); Johore (*Davisan, Boden Kloss*).

GENERAL RANGE.—From slightly north of the latitude of Penang to the southern extremity of the Malay Peninsula, Borneo, Sumatra. In the elevated districts of Borneo its place is taken by a slightly differentiated form, *Rhizothera dulitensis*, Grant.

MALAY NAME.—Selantin.

* 23. *TROPICOPERDIX CHARLTONI*—THE RED-LEGGED HILL-PARTRIDGE.

Arboricola charltoni (Eyt.); *Ogilvie-Grant, t.c.*, p. 221.

Tropicoperdix charltoni, *Sharpe, t.c.*, p. 30.

In habits and in the localities affected this bird closely resembles the preceeding species. It is however, much rarer and shyer and is but seldom seen, those specimens that have been obtained, having mostly been snared. It is readily distinguished from all allied species by having a small concealed patch of downy, snow-white feathers on the flanks, beneath the wings.

LOCALITIES IN THE PENINSULA.—Penang (*Cantor*); Perak: Piah Valley (*Wray*); Northern Pahang (*Waterstradt*); Malacca (*Charltoni*).

The locality Penang is such open to doubt and the specimens probably came from Kedah or Province Wellesley.

GENERAL RANGE.—Throughout the Malay Peninsula to Siam and possibly Southern Tenasserim, Sumatra and North Borneo.

MALAY NAME.—Sang serok.

† 24. *ARBORICOLA CAMPBELLI*—CAMPBELL'S TREE PARTRIDGE.

Arboricola campbelli, *Ibis*, 1905, p. 165, pl. IV; *antea* p. 105.

The three specimens of this species that have been obtained were found among dense rotan jungle and ran with extreme swiftness when disturbed; they were never seen to use their wings.

LOCALITIES IN THE PENINSULA.—Perak: Telom Valley on the borders of Pahang, 3,500 ft. (*Robinson*).

Readily separated from all other species by the black head striped with white in the facial region and by the dark-grey undersurface.

25. *CALOPERDIX OCULEA*—THE FERRUGINOUS WOOD-PARTRIDGE.

Caloperdix oculea (Temm.); *Ogilvie-Grant, t.c.*, p. 222 *Sharpe, t.c.*, p. 30.

Nothing is known of the habits of this species ; it is not represented in any of the local museums and no specimens have to my knowledge been obtained of late years ; in the territory of Malacca, where at one time it appeared to be not uncommon it is now very probably extinct owing to the destruction of the forests for tapioca plantations, while in the native states north of Penang the extension of the pepper industry similarily threatens the existence of the species.

Localities in the Peninsula.--Kodoh (*Darling*) ; Perlis (*Cantor*) ; Kedah (*Cantor*) ; Malacca (*Maingay, Pinwill*).

General Range.—From Southern Tenasserim, down the Western side of the Peninsula to Malacca. Not recorded from the Eastern side of from any of the Federated Malay States. Closely allied species are found in Sumatra, Java and Borneo where they occur in hill forest.

* † 26. *ROLLULUS ROULROUL*—THE CRESTED GREEN WOOD QUAIL.

Rollulus roulroul (Scop.) ; *Ogilvie-Grant, t.c.*, p. 225 ; *Sharpe, t.c.*, p. 30.

This handsome little game bird is quite the commonest jungle species in the Malay Peninsula and is widely distributed in suitable localities on both sides of the main range, frequenting all types of forest, except the swampy tracts near the coast and the very highest mountains. Usually it is found in pairs but at certain times of the year it congregates in conveys of eight or nine individuals and on one occasion at Kuala Tembeling in Pahang I obtained four specimens at one shot. Its diet is mixed and those birda that I have examined had been feeding on seeds insects and small mollusca. The note is a low clear whistle and the bird is sometimes snared by imitating its call on the same decoy pipe as that employed for catching the ground dove *Chalcophaps indica*.

General Range.—From Southern Tenasserim and Siam, through the Malay Peninsula to Sumatra, Borneo and Java.

Malay Name.—Burong siul.

* † 27. *MELANOPERDIX NIGRA*—THE BLACK WOOD PARTRIDGE.

Melanoperdix nigra (Vig.) ; *Ogilvie-Grant, t.c.*, p. 228 ; *Sharpe, t.c.*, p. 30.

In the Black Wood Partridge the sexes differ considerably in colour, the male being uniform glossy-black, while the female is dull chestnut with a transverse-black band on the shoulders.

In habits it is very similar to the preceding species but is usually met with solitary or in pairs. It does not ascend the hills to any great elevation and is met with most frequently in lowlying forest near the coast and in jungle where the prevailing under growth is the bertam palm (*Eugeissona tristis*) whence the bird derives its Malay name.

General Range.—From about the latitude of Penang southwards through the Malay peninsula to Sumatra and Borneo.

Malay Name.—Burong bertam.

*†28. *EXCALFACTORIA CHINENSIS*—THE BLUE BREASTED BUTTON QUAIL.

Excalfactoria chinensis (Linn.); *Ogilvie-Grant, t.c.*, p. 250; *Sharpe, t.c.*, p. 32.

The Blue-breasted Button Quail is common in settled districts throughout the Peninsula. It is found principally in stretches of abandoned cultivation and mining land that have been overgrown with lalang grass (*Imperatoria koenigi*) and in paddy fields that are lying fallow or have just been reaped. It is especially abundant in the "tana tenggala" or plough land along the banks of the Jelei and lower Tembeling rivers in Pahang. Usually it is met with, singly or in pairs, but towards the end of the year in coveys of six or seven that lie very close. The breeding season is in July or August and the nest consists merely of a few wisps of withered grass placed in a hollow among low bushes or high lalang grass. The eggs are six or seven in number, dull greenish olive, faintly speckled with black.

General Range.—From the Peninsula of India, throughout the southern part of Asia to Formosa, Celebes and the Moluccas. A closely allied race inhabits the other islands of the Malay Archipelago, the Philippines and Australia.

Malay Name.—Pikau.

*†29. *ACOMUS ERYTHROPHTHALMUS*—THE BUFF TAILED FIREBACK PHEASANT.

Acomus erythrophthalmus (Raffles); *Ogilvie-Grant, t.c.*, p. 283; *Sharpe, t.c.*, p. 34.

Very little indeed is known of the habits of this Fireback which is by no means a common bird in the central portions of the Malay Peninsula, though at one time it must have been very abundant in the territory of Malacca and the northern parts of Johore, judging from the numbers of Malacca trade skins that are to be found in European Museums.

As a rule it is met with in low country jungle, not ascending the hills, but inhabiting much the same type of country as is affected by *Melanoperdix nigra*. In some districts it is not uncommon in old second growth jungle or "blukar" in the vicinity of small native villages. Like its near allies it is polygamous and the females appear to be very much more numerous than the males.

Localities in the Peninsula.—Kedah (*Cantor*); Penang (*Cantor*): Province Wellesley (*Cantor*); Perak: Kuala Kangsar (*Kelham*); Selangor: Kuala Lumpur (*Sel. Mus.*); Malacca; Johore (*Boden Kloss*); Singapore.

The localities Penang and Singapore, which rest on old specimens in the British Museum, are open to very considerable doubt. The species does not now, if it ever did, occur in either of the islands.

General Range.—Throughout the Malay Peninsula, south of Kedah, Sumatra and possibly Java.

Malay Name.—Kuang bertam or Mata merah.

*†30. *LOPHURA RUFA*—VIEILLOT'S FIREBACK-PHEASANT.

Lophura rufa (Raffles); *Ogilvie-Grant, t.c.*, p. 286; *Sharpe, t.c.*, p. 34.

This bird frequents precisely similar localities to the preceding species, but is perhaps somewhat commoner. It is readily domesticated and specimens are frequently seen in captivity, which is very rarely the case with Acomus erythrophthalmus.

Localities in the Peninsula.—Generally distributed but especially common in the neighbourhood of Kuala Kangsar, Perak (*Kelham*); and Kuala Tembeling, Pahang (*Robinson*).

General Range.—From Southern Tenasserim and Siam to the southern extremity of the Malay Peninsula, Sumatra.

Malay Name.—Pegar.

*†31. *GALLUS GALLUS*—THE JUNGLE-FOWL.

Gallus gallus (Linn.); *Ogilvie-Grant, t.c.*, p. 344; *Sharpe, t.c.*, p. 39.

The Jungle-fowl is universally distributed throughout the Peninsula, mainly frequenting second growth jungle near villages and patches of bamboo forest. On the east coast they are especially common in the thick bush scrub surrounding the buffalo grazing ground into which they emerge in the early mornings and evenings, affording excellent shooting; elsewhere they keep to cover too close to afford much sport. The breeding months are from February to June, according to district and season, and about seven or eight pale *café au lait* eggs are laid in a hollow in the ground, usually among clumps of bamboo. The true Malayan domestic breed is practically identical with the wild form, with which crosses frequently take place.[1]

General Range.—Throughout Southern Asia from Peninsular India to Cochin-China and Hainan, including most of the larger islands of the Indian Archipelago except Borneo.

Malay Name.—Ayam utan; Ayam borga; Ayam dĕnak.

*†32. *POLYPLECTRON MALACCENSIS*—THE PEACOCK-PHEASANT.

Polyplectron malaccensis (Scop.); *Hartert, Nov. Zool.*, ix., p. 538 (1902).

Polyplectron bicalcaratum (Linn.); *Ogilvie-Grant, t.c.*, p. 357; *Sharpe, t.c.*, p. 39.

Widely distributed throughout the lower foot hills of the Malay Peninsula, its place being taken in the higher ranges by the succeeding species. It is, if possible, an even shyer bird than the Argus-pheasant, though its note, which may be represented by the syllables *wok-wok*, three or four times repeated at various intervals, is often heard.

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[1] *Gallus varius*, a Javan species that may be recognised by possessing a long median wattle on the throat, is said to have been obtained in Singapore and Southern Johore. The evidence for the occurrence of this species in a wild state in the Peninsula is however insufficient, the specimens in question being either domesticated varieties or aviary birds imported by Chinamen.

Nothing appears to be known about the nidification of the Malayan species, but the closely allied Burmese form is said to lay two eggs only, an unusually small number for a game-bird.

General Range.—The Malay Peninsula and Sumatra. The alleged occurrence in Tenasserim is decidedly doubtful, and authenticated specimens have not been obtained from further north than Salanga or Junk Ceylon.

Malay Name.—Kuang chermin.

† 33. *CHALCURUS INOPINATUS*, Rothsch.

Chalcurus inopinatus (Rothsch) ; *Bull., B.O.C.*, p. 42 (1904).

The present species is somewhat closely allied to the preceding, from which it may be distinguished by having the sides of the head feathered, not naked, and only slightly crested, by its relatively longer tail and by the ground colour of the plumage above being chestnut, not greyish.

In habits it ressembles most of the other species of game-birds inhabiting dense jungle, running with extreme swiftness, and never taking wing until very hard pressed. It frequents dark and damp ravines above 3,000 ft., and appears to feed principally on small insects and millipedes and the fruit of a creeping rotan, very common in the mountains.

Localities in the Peninsula.—Pahang: Ulu Dong (*Waterstradt*); Gunong Tahan, 3,000 ft. (*Wray* and *Robinson*); Selangor: Gunong Mengkuang Lebah, 4,000-5,800 ft. (*Robinson*).

General Range.—Mountains of the Malay Peninsula. The only other species of the genus *Chalcurus chalcurus* (Less.) inhabits the mountains on the west coast of Sumatra.

34. *RHEINARDIUS NIGRESCENS*—THE MOUNTAIN ARGUS-PHEASANT.

Rheinardius ocellatus nigrescens (Rothsch) ; *Bull., B.O.C.*, xii., p. 55 (1902) ; *Hartert, Nov. Zool.*, ix., p. 538.

This magnificent bird is very closely allied to a species found in the mountains of Annam, French Indo-China, which has hitherto been considered to be one of the rarest of all game-birds.

The three original specimens, which formed the basis of Mr. Rothschild's description, were secured, according to information obtained by me, by Mr. Waterstradt's native hunters on the Ulu Dong, a river takes its rise on Gunong Benom. Mr. Wray and myself found it to be by no means uncommon on the lower spurs of Gunong Tahan, apparently being found in the same situations as the common Argus, though perhaps it ranges somewhat higher up the hills. Tail feathers of both species were found on the same showing-off ground. Despite our utmost efforts, which included the manufacture of a fence trap, two miles long, with snares every fifty yards, we only succeeded in catching two specimens, of which one was utterly spoilt by a musang before the trap was visited, but dozens of the common variety were secured, which formed a very welcome addition to our commissariat. The single perfect specimen was shot by one of our Dyaks, who had a singular gift for securing rare and shy ground birds.

The species does not ascend to any great elevation, certainly not above 4,000 ft., and is not, so far as my experience goes, found on the Selangor ranges, though certainly occurring on the high mountains of Batang Padang in Southern Perak. The call is very different to that of the common species, and is readily recognised when once heard, though it is hard to put the difference into words.

Localities in the Peninsula.—Pahang: Ulu Dong (*Waterstradt*); Gunong Tahan, 1,500-3,000, ft. (*Wray* and *Robinson*).

*† 35. *ARGUSIANUS ARGUS*—THE ARGUS-PHEASANT.

Argusianus argus (Linn.); *Ogilvie-Grant, t.c.*, p. 363; *Sharpe, t.c.*, p. 40.

The Argus-Pheasant is common everywhere in old jungle, throughout the Peninsula up to about 3,500 ft., but is not found in the swampy coastal districts. The bird is, however, so exceedingly shy that it is only very rarely indeed that it is possible to catch sight of one, and I myself, with a fairly extensive experience of jungle life, have only actually seen the wild bird once. Nevertheless, they are very easily trapped, and the Sakais of certain districts often capture the chicks and rear them with their domestic poultry. They are solitary in their habits, the males keeping apart from the females except at the breeding season, and the former has the curious habit of clearing a playing- or showing-off ground for himself by removing every leaf or fallen twig from a circular patch, sometimes four or five yards in diameter. These playing grounds are usually situated on a steep ridge, and by running a long low fence, slightly below the crest, with openings every thirty or forty yards, set with snares, one is generally able to catch a considerable proportion of the birds in the vicinity.

General Range.—From South Tenasserim throughout the Malay Peninsula to Sumatra, and also in Siam.

Malay Name.—Burong kuang.

*† 36. *PAVO MUTICUS*—THE JAVAN PEAFOWL.

Pavo muticus (Linn.); *Ogilvie-Grant, t.c.*, p. 371; *Sharpe, t.c.*, p. 40.

The Peafowl has a somewhat peculiar distribution in the Malay Peninsula, being commoner on the eastern side and to the north than on the west and south. On the upper reaches of the Perak River it is abundant, but becomes very rare south of Kuala Kangsar. From Selangor, Negri Sembilan and Johore, it has not, so far as I am aware, ever been recorded, though it probably exists in Jelebu. Though at one time common in Malacca, it is now extinct there. It has been obtained in Trengganu by Dr. Abbott and Mr. Boden Kloss, and is very numerous on the Pahang River and its larger tributaries. It is locally abundant in certain districts of Kelantan and at Mabek, on the borders of Jalor and Rhamaan, near the headwaters of the Patani River. I obtained numerous specimens, though on the lower reaches of that river which are thickly populated, it is not to be found.

It does not occur, as a rule, in deep jungle, but frequents by preference sandy river banks, where it is to be seen in parties of four or five in the early morning, retiring to thick scrub in the heat of the day and roosting in high trees at night. The note is harsh and strident, the

Malay name for the bird being a rendering thereof, and can be heard for great distances. The nesting season in Pahang appears to be about April, and males are in their finest plumage in that and the two succeeding months.

General Range.—From Assam through the Indo-Chinese countries and the Malay Peninsula to Java, but not in Borneo or Sumatra.

Malay Name.—Burong merah.

*†37. *TURNIX TAIGOOR*—THE BUSTARD QUAIL.

Turnix taigoor (Sykes); *Ogilvie-Grant, t.c.*, p. 530.

Turnix pugnax, *Sharpe, t.c.*, p. 48.

The Bustard Quail is common throughout the Peninsula, in situations similar to those affected by the Blue-breasted Button Quail, but unlike that species is rarely if ever found in coveys. Females are larger and more brightly coloured than the males, and in this genus a reversal of the ordinary rules takes place; the females courting the males, while the latter perform the duties of incubation.

Hens are very pugnacious, and the Malays take advantage of this fact by using a decoy cage, which closes as soon as the wild bird enters to attack its inmates. The birds so captured are pitted against each others, and large sums are often staked on a specially proficent bird.

The eggs are usually four in number, somewhat pointed at one end, and are pale-greyish olive, thickly spotted with brownish olive and brown, the markings being often more densely congregated at one end, forming a zone. The nest is little more than a slight depression among long grass, but is sometimes lined with a few dead leaves. In Selangor, the breeding season appears to be the months of June and July.

General Range.—Throughout Southern Asia, from India to China and Formosa, as well as in Northern Ceylon. In Southern Ceylon, Java and Sumatra, its place is taken by a slightly different form.

Malay Name.—Puyok.

RETURN OF THERMOMETER READINGS AT TRIG. STATIONS IN THE FEDERATED MALAY STATES IN ORDER OF ALTITUDE.*

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum. Mean.	Maximum. Greatest recorded.	Minimum. Mean.	Minimum. Least recorded.	Mean.	Range.
	Feet.	Miles.		°	°	°	°	°	°
Gunong Kerbau	7,160	50	1895, July 11–19 ...	68.9	74.0	52.9	51.5	60.9	16.0
" Batu Puteh ...	6,985	57	1898, September 9–24	66.9	72.0	51.6	49.7	59.2	15.3
" Grah	6,900	63	1905, Aug. 4–Sept. 9 ...	74.2	86.0	51.6	48.0	62.9	22.6
" Lyang	6,335	40	1900, Jan. 31–Mar. 20	79.9	93.0	53.3	48.5	66.6	26.6
" Bintang	6,103	35	1895, April 17–28 ...	71.2	77.5	57.1	54.7	64.1	14.1
" "	6,103	35	1901, January 17–25 ...	69.8	75.5	52.9	46.0	61.3	16.9
" Berumban (Phg.)	6,050	50	1899, February 19–24	67.3	88.0	54.2	52.0	60.7	13.1
" Bintang, South ...	5,911	34	1895, April 30–May 3...	75.7	77.3	60.7	60.0	68.2	15.0
" Ulu Kali (Sel.) ...	5,812	36	1901, February 3–20 ...	70.1	78.5	54.5	47.0	62.3	15.6
" Besar (Perak) ...	5,725	57	1902, July 20–Aug. 7...	72.6	82.0	56.2	53.5	64.4	16.4
" Chabang	5,610	45	1896, March 14–25 ...	70.3	72.7	58.2	56.0	64.2	12.1
" Bubu	5,433	17	1895, Oct. 31–Dec. 19	69.8	73.8	59.5	55.0	64.6	10.3
" Bar Gading ...	5,372	56	1898, July 24–Aug. 8 ...	72.9	79.0	57.5	56.7	65.2	15.4
" Lebah	4,989	45	1899, May 28–June 17	74.7	79.4	58.7	54.0	66.7	16.0
" Besar (Sel.) ...	4,799	48	1901, May 17–26 ...	74.9	79.5	60.6	59.0	67.7	14.3
" " ...	4,799	48	1902, July 27–Aug. 5...	76.4	80.0	58.6	57.0	67.5	17.8
" Hijau Larut ...	4,750	19	1895, February 20–28	71.7	75.0	58.8	57.3	65.2	12.9
" " ...	4,750	19	1898, December 14–23	70.4	72.5	57.7	56.5	64.0	12.7
" " ...	4,750	19	1905, December 16–23	74.8	81.5	57.5	55.0	66.1	17.3
" Bunga Buah (Sel.)	4,650	31	1900, April 17–20 ...	75.7	76.0	61.2	60.2	68.4	14.5
" Chingkai	4,620	48	1905, November 20–29	79.8	85.0	58.0	55.2	68.9	21.8
" " "	4,620	48	1905, Oct. 18–Nov. 4 ...	75.8	79.0	60.6	57.5	68.2	15.2
" Ulu Semangko ...	4,576	43	1900, December 2–12...	74.4	79.5	59.9	57.0	67.1	14.5
Mount Ophir (N. S.) ...	4,186	20	1901, Feb. 15–Mar. 9 ...	68.5	72.7	59.3	56.5	63.9	9.2
" "	4,186	20	1904, Jan. 25–Mar. 10	73.9	85.0	59.6	56.0	66.8	14.3
Water-Shed, Ulu Bernam Pass into Pahang ...	4,140	54	1896, June 17–28 ...	81.8	87.0	63.7	62.5	72.7	18.1
Gunong Bujang Melaka ...	4,070	44	1895, August 12–27 ..	72.5	76.5	61.3	59.0	66.9	11.2
" " ...	4,070	44	1898, July 12–21 ...	75.6	78.5	60.3	56.8	67.9	15.3
" Kendrong ...	4,020	48	1903, Jan. 2–Feb. 6 ...	82.1	91.5	59.0	54.5	70.5	23.1
" Biong	3,992	31	1893, July 22–31 ...	73.1	75.8	63.0	61.2	68.0	10.1
" Jerei (Kedah) ...	3,986	6	1894, Mar. 19–April 11	78.8	83.0	63.0	57.5	70.9	15.8
" Telapa Burok (N. S.)	3,915	27	1900, Sept. 12–23 ...	88.0	92.3	62.7	58.5	75.3	25.3
" " ...	3,915	27	1902, November 11–29	76.8	79.0	61.8	59.0	69.3	15.0
" Berumbun (N. S.)	3,295	24	1899, July 17–20 ...	74.5	78.2	67.3	66.5	70.9	7.2
" " "	3,295	24	1900, September 25–28	72.5	75.3	62.8	62.5	67.6	9.7
" " "	3,295	24	1902, December 4–5 ...	86.0	86.0	64.0	64.0	75.0	22.0
" Rembau	2,899	15	1903, Feb. 12–Mar. 3...	78.4	84.0	64.0	61.0	71.2	14.4
" Chante (Perak) ...	2,890	39	1903, Oct. 29–Nov. 14	81.6	91.0	66.0	62.0	73.8	15.6
" Angsi (N. S.) ...	2,659	20	1899, October 17–28 ...	76.4	79.5	66.3	64.8	71.4	10.1
" " ...	2,659	20	1900, November 18–23	80.3	83.5	65.1	64.0	72.7	15.2
" " ...	2,659	20	1903, August 17–19 ...	85.5	87.0	64.0	62.0	74.7	21.5
" Ulu Beranang (N. S.)	2,655	29	1900, Oct. 28–Nov. 1...	82.7	85.7	67.0	66.5	74.8	15.7
" Krengga (Perak)	2,650	33	1905, Nov. 22–Dec. 8...	89.2	92.5	61.9	62.0	75.5	27.3
" Kledang " ...	2,646	28	1903, November 21–22	82.5	84.0	62.5	62.0	72.5	20.0
" Tampin (N. S.) ...	2,507	16	1899, December 8–13...	78.0	85.5	65.2	64.5	71.6	12.8
" " " ...	2,507	16	1903, April 12–24 ...	88.2	91.0	68.6	66.0	78.4	19.6

* Extract from the Report on the Trigonometrical and General Survey Department for the year 1905.

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum.		Minimum.		Mean.	Range.
				Mean.	Greatest recorded.	Mean.	Least recorded.		
	Feet.	Miles.		°	°	°	°	°	°
Gunong Tampin South (N.S.)	2,413	15	1903, Mar. 18–April 11	84.2	88.0	66.8	65.0	75.5	17.4
Bukit Unyang (Sel.) ...	2,393	23	1899, November 1–11	83.5	87.6	66.5	64.8	75.0	17.0
" " " ...	2,393	23	1900, August 23–30 ...	83.1	88.0	67.7	66.0	75.4	15.4
" Chondong	2,315	35	1899, April 3–23 ...	89.6	94.0	67.8	65.8	78.7	21.8
" Batu Angus (N. S.)	2,290	38	1902, April 29–May 10	88.1	92.0	67.3	65.5	77.7	20.8
" Batu Bruas " ...	2,082	52	1904, May 23–29 ...	88.5	94.0	67.8	67.0	78.2	20.7
" Sekamat	2,200	31	1899, October 24–28 ...	80.8	82.3	65.2	64.0	73.0	15.6
" "	2,200	31	1900, May 17–20 ...	88.6	93.0	68.0	67.0	77.8	21.6
" Buaian (N. S.) ...	2,125	33	1902, July 3–16 ...	84.3	89.0	67.9	67.0	76.1	16.4
" Palong " ...	2,100	48	1902, Aug. 23–Sept. 1	84.7	88.0	67.2	65.0	75.9	17.5
" Galla (N. S.) ...	2,014	15	1900, January 22–25 ...	84.2	85.5	67.6	66 8	75.9	16.6
" " " ...	2,014	15	1900, October 17–22 ...	85.5	87.3	69.5	67.5	77.5	16.0
" Lagong (Sel.) ...	1,886	21	1899, October 12–15 ...	88.7	90.0	67.6	67.0	78.1	21.1
" " " ...	1,886	21	1900, September 15–26	81.8	87.0	69.7	65.0	75.7	12.1
" Madei	1,697	29	1904, July 22–25 ...	91.0	99.0	67.3	67.0	79.2	23.7
" Sigari (Dindings) ..	1,615	3	1896, July 24–Aug. 8...	84.0	85.0	71.9	68.5	77.9	12.1
" Berakih (Perak) ...	1,490	42	1905, Oct. 27–Nov. 4...	90.5	95.5	70.4	68.5	80.4	20.1
" Batang Malaka (N. S.)...	1,420	22	1901, August 3–7 ...	87.4	90.0	68.3	64.3	77.8	19.1
" " " ...	1,420	22	1904, March 14–19 ...	87.2	91.0	68.4	66.0	77.8	18.8
" Snaling (N. S.) ...	1,384	28	1899, November 20–26	79.8	81.0	68.7	68.0	74.2	11.1
" " " ...	1,384	28	1901, August 20–24 ...	92.1	100.0	69.4	68.0	80.7	22.7
" " " ...	1,384	28	1903, July 3–8 ...	84.0	85.0	72.3	70.0	78.1	11.7
Changkat Besout	1,368	28	1899, February 19–27	90.0	95.5	69.2	66.0	79.6	20.8
Gunong Semanggol (Perak)	1,279	10	1901, August 7–10 ...	93.2	93.5	73.0	73.0	83.1	20.2
Bukit Jeram Padang (N. S.)	1,170	40	1903, November 11–22	90.5	100.0	65.8	66.0	78.1	24.7
" Prabong (Sel.) ...	1,163	28	1900, January 16–20 ...	90.9	92.0	70.5	69.9	80.7	20.4
" " " ...	1,163	28	1900, July 17–24 ...	89.1	91.0	70.7	69.0	79.9	18.4
" Champaral (N. S.) ...	1,159	27	1903, June 23–28 ...	87.8	90.0	68.7	67.0	78.2	19.1
" Narran	1,157	31	1899, July 12–23 ...	95.1	97.5	69.4	65.8	82.2	25.7
" Tunggal (Sel.) ...	1,144	21	1899, September 18–27	90.0	94.8	71.6	69.6	81.2	19.3
" " " ...	1,144	21	1900, June 24–29 ...	91.3	93.0	72.7	70.5	82.0	18.6
" Besar (Jerei) N. S.	1,121	37	1903, Nov. 30–Dec. 11	82.1	94.0	70.2	64.0	76.1	11.9
" Ungka Busuk (Dindings)	1,084	2	1896, July 2–10 ...	83.7	87.0	73.0	70.0	78.3	27.2
" Senorang	1,032	57	1904, May 2–5 ...	99.7	103.0	86.1	71.0	86.1	10.7
" Sungei Besi (Sel.) ...	972	22	1900, Aug. 30–Sept. 7	93.5	97.5	70.5	69.0	82.0	23.0
" Srigala	936	28	1896, July 28–Aug. 5...	91.1	92.8	72.1	69.3	81.6	19.0
" "	936	28	1900, June 1–7 ...	88.0	92.0	72.7	70.0	85.0	21.9
" Lembah	929	29	1899, November 26–29	90.7	94.0	70.1	69.0	80.4	20.6
" Rasa (Sel.)	925	28	1901, August 3–4 ...	96.5	96.5	73.1	73.0	84.8	23.4
" Tunggu (Sel.) ...	910	20	1900, August 7–12 ...	90.5	92.8	71.3	70.0	80.4	19.2
" Asa (Sel.)	874	28	1899, August 14–18 ...	94.5	96.5	69.8	69.0	82.1	24.7
" South Hummock (N. S.)	837	6	1900, April 14–17 ...	88.4	89.5	73.6	72.0	81.0	14.8
" " " ...	837	6	1902, March 18–19 ...	98.0	98.0	71.0	71.0	84.5	27.0
" Jugra (Parcellar Hill)	791	3	1900, Sept. 25–Nov. 16	89.3	97.5	71.2	69.0	80.2	18.1
" North Hummock (Sel.)	741	10	1900, July 21–25 ...	93.9	96.3	70.4	70.0	82.1	23.5
" Batu Tiga (S. E. Dindings) ...	690	1	1896, July 14–18 ...	93.5	94.0	74.4	72.0	83.9	19.1
Changkat Rembian ...	668	44	1895, Nov. 30–Dec. 9...	87.8	90.3	70.9	69.5	79.1	16.4
Bukit Tunggal (Perak) ...	651	24	1896, June 14–17 ...	92.8	95.0	72.0	71.0	82.4	20.8

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum. Mean.	Maximum. Greatest recorded.	Minimum. Mean.	Minimum. Least recorded.	Mean.	Range.
	Feet.	Miles.		°	°	°	°	°	°
Bukit Tunggal (N. S.) ...	533	12	1899, September 4–14	87.6	91.2	72.0	71.0	79.8	15.6
" Bharu	426	30	1899, December 8–13...	89.8	94.0	71.0	69.2	80.4	18.8
" Tambun Tulong (N. S.	398	14	1900, June 22–24 ...	92.5	93.0	73.5	72.7	83.0	19.0
Cape Rachado L. H. ...	376	...	1900, July 10–19 ...	83.2	83.7	79.6	77.0	81.4	3.6
" " ...	376	...	1903, January 16–28 ...	87.3	89.5	75.4	71.0	81.4	11.9
Bukit Bantan (N. S.) ...	275	35	1902, February 19–23	91.0	91.7	66.2	65.0	78.6	24.8
" Jeram (Sel.) ...	219	1	1900, March 6–9 ...	94.2	95.3	72.3	72.0	83.3	21.9
" " " ...	219	1	1900, June 2–5 ...	91.6	95.2	74.1	72.9	82.8	17.5
" Lipat Kajang (Sel.)	209	9	1900, July 5–12 ...	96.3	99.0	72.7	71.8	84.5	23.6
Changkat Jong	193	28	1896, January 17–27 ...	92.7	95.0	71.0	69.0	81.8	21.7
P. Angsa L. House (Sel.)...	80	...	1900, June 7–11 ...	97.9	102.5	81.4	78.0	89.6	16.5
Kuala Selangor Fort ...	74	...	1900, May 24–31 ...	96.0	100.5	74.1	68.0	85.0	21.9
Taiping	70	8	1894–1903	86.8	97.3	74.0	64.3	80.4	12.8
Pulau Arang (N. S.) ...	53	...	1902, March 11–16 ...	98.5	99.5	73.4	73.0	85.9	25.1
Rantau Panjang (Bernam R.)	40	16	1900, July 10–29 ...	91.3	93.3	70.5	68.8	80.9	20.8
Kampong Datoh Khalipa (Bernam R.)	20	8	1900, July 5–27 ...	90.7	94.0	71.7	68.9	81.2	19.0

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JOURNAL OF THE F.M.S. MUSEUMS.

NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

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